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CONTENTS

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with every copy of this week's issue

A Consulting Engineer's Centenary

A YEAR of noteworthy centenaries has added another to its list with the celebration on December 19 of 100 years of activity by the firm of Messrs. Rendel, Palmer & Tritton, consulting engineers. It was recalled at the dinner with which the occasion was commemorated (reported on page 1100), that the founder of the firm, James Meadows Rendel, was engaged upon important civil engineering work from the age of 22, and launched the enterprise when he was 38, in association with Nathanael Beardmore. In its first 75 years the name of the firm was generally altered as the partners were changed by resignation, death, or otherwise, but since 1913, when Mr. Frederick Rendel joined the partnership, the present title has remained unaltered. In 100 years the firm has had thirteen partners, of whom five are surviving today (although two are in retirement). During its existence the firm has advised on the construction of thousands of miles of railway and the bridging of most of the great rivers of India; it has been associated with such great harbour works as those at Takoradi, and numerous works in the Port of London. Great bridges to its credit include the Zambesi bridge, and the Howrah bridge at Calcutta now under construction, with a single span of 1,500 ft. Many personalities of the firm were recalled by Mr. E. J. Buckton, the present senior partner, in his speech at the centenary dinner, including Sir Frederick Palmer, in our opinion one of the greatest engineers of our time.

The Cardiff Division, G.W.R.

Mr. F. G. Wainwright, who has been Divisional Superintendent at Cardiff, G.W.R., since 1924, is retiring at the end of this month. It will be seen from the biographical notice we publish on page 1098 that his appointment to that office coincided with a reorganisation of the boundaries of the division which, while handing over the Monmouthshire valleys to Newport, brought into it the former Barry, Rhymney, and Taff Vale Railways. The three companies referred to had hitherto conducted their business on a competitive basis, but now the docks at Cardiff and Barry also having been brought under Great Western control, the matter took on a new complexion. It was first necessary to obtain uniformity of practice, and adopt methods conforming with the Great Western standard. There was staff redundancy; overlapping or duplication of routes; and instances of short working by one company to a junction with another intermediately, entailing expensive exchange operations. Each line had its separate train control, and indeed was totally self-contained. It occupied a few years to unify and "Great Westernise" these component parts. Unnecessary routes were abandoned; direct working from pit to port became the vogue; and a closer degree of co-ordination between the rail and dock operations was developed.

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The Week's Traffics

Declines of £59,000 under passengers, of £175,000 under merchandise, and of £62,000 under coal make up the total of the traffic decrease of £296,000 shown by the four group companies for the past week in comparison with the corresponding week in 1937. For the 49th week the set-back was £266,000

	50th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 24,000	− 82,000	− 17,000	−123,000	− 3,050,000	− 4·77
L.N.E.R. ..	− 16,000	− 68,000	− 23,000	−107,000	− 2,334,000	− 4·99
G.W.R. ..	− 9,000	− 23,000	− 18,000	− 50,000	− 1,183,000	− 4·42
S.R.	− 10,000	− 2,000	− 4,000	− 16,000	− 196,000	− 0·94

Comparisons with 1936 are made in the following table:—

	50th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	− 15,000	− 64,000	+ 16,000	− 63,000	− 281,000	− 0·43
L.N.E.R. ..	− 9,000	− 49,000	− 12,000	− 70,000	− 128,000	− 0·29
G.W.R. ..	—	− 26,000	− 3,000	− 29,000	+ 208,000	+ 0·82
S.R.	− 10,000	—	—	− 10,000	+ 647,000	+ 3·22

The net increase of £466,000 in the aggregate figures of 1938 over those of 1936 is made up of improvements of £2,631,000 under passengers and of £869,500 under coal, less a decrease of £3,034,500 under merchandise.

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Pullman Car Results

Operating results for the year ended September 30, 1938, were less favourable than those for the previous year. Gross receipts were reduced by £17,983 or 6·09 per cent., and working expenses were higher by £1,991 or 0·93 per cent., so that net receipts were £19,974 lower. Total net income for the year, after crediting interest, &c., £6,342, and deducting £5,000 for debenture interest and superannuation fund, was £63,117. In view of the proposed capital reconstruction scheme the directors last year carried forward £103,296. Under that scheme, which became effective on April 11, 1938, the preference and ordinary capital was reduced from £1,125,000 to £237,500 in ordinary "A" and "B" shares, and £437,500 of 5 per cent. cumulative income stock was created, of which £33,299 has now been redeemed. The net income of 1937-38 and the balance carried forward from the previous year have been utilised as to £38,879 for depreciation, £21,042 for income stock interest, £16,406 for dividend

on the old preference stock, £83,617 for reduction of capital, and £1,552 for expenses of reconstruction, leaving £4,917 to be carried forward.

	1936–37	1937–38
	£	£
Gross receipts	295,215	277,232
Working expenses	213,465	215,456
Net receipts	81,750	61,776

Of the traffic decrease of £17,983 some £12,500 was in respect of supplementary fares largely due to the reductions made on the L.N.E.R. section. In the Continental services the number of passengers fell from 113,614 to 105,130, but receipts rose from £59,988 to £60,820.

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Mexican Railway Results

The report of the Mexican Railway Co. Ltd. for the half-year ended June 30, 1938, shows that receipts from passenger train traffic improved by 53,830 pesos, but goods receipts fell by 259,912 pesos notwithstanding an increase of 535,273 in tonnage, and gross receipts were 2·4 per cent. lower. Working expenses increased by 4·5 per cent., bringing the operating ratio up from 94·24 per cent. to 100·96 per cent. Every effort is being made to reduce expenditure, but the devaluation of the peso, which followed the petroleum crisis of last March, has increased the cost of services essential to the company's working which have to be paid for in United States dollars. Comparative figures for the first halves of 1937 and 1938 follow:—

	1937	1938
	Pesos	Pesos
Passenger and express receipts	2,034,519	2,088,349
Goods receipts	5,909,909	5,649,997
Gross receipts	8,069,831	7,874,337
Working expenses	7,603,863	7,949,718
Profit (+) or loss (—)	+ 465,168	— 75,381

At the standard rate of 18 pesos to £1 the loss on working is equivalent to £4,188, and the total deficiency for the year is £112,531, bringing the total debit of net revenue to £974,010. The scheme of arrangement for the extension of the existing moratorium for a further three years was sanctioned by the High Court on Monday, December 12.

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Film Records

One of our overseas correspondents records this week that when the Germans occupied the Sudeten areas they sent advance contingents to take film records of the condition of the railways, this method being much more rapid and reliable than that of written reports. Within a few days the completed films were available to provide the necessary information as to what would be required to reinstate the railways which had been damaged or depleted in equipment. This is a way of keeping records which suggests extension in many directions of railway activity. Not only does it enable reports to be provided rapidly, but it can give very much more detail than a written description and is easier to assimilate quickly. The progress of civil engineering works particularly lends itself to this method of recording, and of course for research purposes the cinematograph, with its slow-motion adaptation can be invaluable. It may be recalled that we described the Reichsbahn film service in an editorial article in our issue of December 24, 1937.

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Cotswold Style for Cotswold Stations

Bourton-on-the-Water and Stow-on-the-Wold, two adjacent and quaintly-named stations on the branch of the Great Western Railway which threads its way through the Cotswold country from Cheltenham to Banbury, have recently been rebuilt in a style in keeping with the much-praised architecture of the locality. Cotswold architecture, the traditions of which have been followed in the design of the new buildings, has the advantage that when used for new buildings, it gives the appearance of dignity and maturity rather than of sham antiquity as say a " black and white " or thatched construction would. That this rural style can be applied successfully to such a utilitarian object as a railway station, keeping it in harmony with its surroundings without destroying the individuality of its purpose, can be seen from the illustrations on page 1093. The exteriors of the buildings are of local stone with dressed quoins, and the roofs are covered with stone tiles, all executed by men skilled in this class of work. The accommodation provided is typical of wayside stations of this size, and the internal decorations are in keeping with the general design.

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Unjustified Pessimism

In describing (on page 1103) an experiment in agreed rates on the Bombay, Baroda & Central India Railway, a correspondent laments the hard case of railways under existing conditions of competition with alternative forms of transport. He deplores the *laissez-faire* attitude which has permitted so much unrestricted development of road transport, and which has given rise to a duplication of service likely, in our correspondent's opinion, to become a burden on trade and industry, either directly by forcing up charges on non-competitive traffic, or indirectly by being a drain on national taxation. We are sorry to observe so much pessimism about at the present time, and our correspondent himself suggests an alternative to disaster when he refers to the " almost embarrassingly prolific " traffic of past years. Sooner or later, unless a major catastrophe overwhelms the world, it must surely dawn on human consciousness that there is no justification in common sense for slumps while nature remains prolific and engineering skill to adapt to man's requirements the raw materials of nature increases rather than diminishes. The ultimate solution of the railway problem is the removal of artificial restrictions imposed by an obviously faulty money mechanism on the activities which it is natural for people to pursue.

* * * *

The Cost of Coaching Comfort

On page 1081 of this issue a correspondent calls attention to a matter which is, from the operating point of view, of no small importance. For some years past the builders of passenger rolling stock in this country have been able to maintain a fairly constant standard of weight in relation to passenger seating, and even, with the help of welding, to achieve some slight reduction in certain cases. Only in the streamlined trains, with such additional amenities as forced ventilation, acoustic blankets, and more spacious internal accommodation, have there been increases, but from the motive point of view, even allowing for the higher speeds of these trains, the problem of haulage has been mitigated by rigid limitation of seating accommodation. Now, however, that the same amenities are being extended to trains of more or less unlimited formation, like the Flying Scotsman and the Hook Continental of the L.N.E.R., the difficulty of haulage has become acute, and timekeeping is suffering. In this connection our correspondent stresses that it is not only a matter of dead weight, but that the greatly increased electrical demands for lighting, cooking, lavatory water heating, and forced ventilation all help to swell the demand on the tractive power of the locomotive. Certainly a case seems to be made out for joint examination by all departments and all areas affected of such problems as these, in the interests

of punctual and efficient operation without any sacrifice of the modern comfort and speed that so attract the public.

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Substitution of Motorbuses for Passenger Trains

In the course of his introductory address to the International Rail Congress at Düsseldorf last September summarised on pages 1087-1089 of this issue, Dr.-Ing. K. Remy, President of the Cologne Division of the Reichsbahn, referred to the combination of rail traffic with road motor traffic. The replacement of passenger train traffic by motorbus lines may be economical in exceptional circumstances, and in such cases a branch line service might perhaps be closed, but such a step should not be taken without careful investigation. If the branch line also carries freight and has to be kept open for this traffic, it may well be found that the goods revenue is sufficient to cover the standing charges, so that the passenger traffic may be handled for the actual running costs, without overheads. In this case it might be found more economical to continue and even improve the rail passenger service, or, in other words, more costly to divert the passenger traffic to a motorbus line, always provided, of course, that the volume of traffic is not likely to decrease. Generally speaking, a mixed bus and rail service would probably involve higher costs, but exceptions may exist, and Dr. Remy quoted the example of a suburban railway where an expensive night train service was replaced by a motorbus line.

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Disc and Crossbar on the G.W.R.

The October issue of the *Great Western Railway Magazine* illustrates a disc and crossbar signal still in use, after some 80 years' service, on the G.W.R. Churchway single line branch, near Cinderford. Originally erected to protect a crossing with a narrow-gauge tramway, no longer used, it now serves as an outer home for the Severn & Wye junction ground frame. The post, of old Barlow rails, is 28 ft. high, the disc 3 ft. 4 in. dia., and the crossbar 7 ft. long by 14 in. deep. Why the signal has never been replaced by a semaphore is not explained. This type of signal lasted for many years on the G.W.R. generally, and Rapier, in his well-known paper to the Civil Engineers in 1874, said that although that railway was abandoning it, the Bristol & Exeter Company still preferred the disc and crossbar. The B. & E. Engineer, Mr. Francis Fox, said it "had the advantage of being more readily seen from a distance." He expressed the view that interlocking had already become "quite a science" and was "surprised to find railway managers of high position and experience preferring to trust to a man's intelligence rather than machinery." He advocated "the combination of the two, by the adoption of efficient machinery under the control of intelligent signalmen." The Bristol & Exeter was then equipped throughout with block apparatus, introduced in 1861 and completed by 1867.

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Dirt and Disrespect

From time to time we have commented on the unhappy appearance of too large a proportion of British locomotive stock by reason of coatings of unrelieved grime, which at times make it difficult, if not impossible, to tell what the colour of the engines was when they left the shops. In years gone by this reproach was generally levelled, by comparison, at Continental locomotives; now the boot is on the other leg. The excuse is, doubtless, that engines now work such lengthy daily mileages that time at the sheds for cleaning is reduced, and, further, that the necessity for economy has so reduced the number of cleaners that cleaners may not be available when the engines are at the shed. As we have previously suggested, however, this may well be a false economy, both from the bad publicity effect of dirty engines, and from the bad psychological effect of putting engine crews in charge of machines which have so totally uncared-for an appearance. There is yet another consideration which cannot be overlooked. Locomotives now frequently bear the names of members of the Royal house, distinguished ladies, famous regiments, and so on. The reactions of the member of a regiment in which a smart turn-out has been an invariable tradition can be imagined when he sees a locomotive bearing the same name, bestowed, very likely, at some formal naming ceremony, in so pitiful a condition of filth; and for an engine to run in such a condition with a Royal name is little short of disrespect.

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Railway Accidents and Speed

The accident bulletin recently issued by the Interstate Commerce Commission Bureau of Statistics, covering the year 1937, surveys the number and causes of accidents on the United States railways for that year. An innovation in this bulletin is the tabulation of accidents according to speed, undertaken in view of the safety question raised by the introduction of fast, lightweight passenger trains. The table shows that the greatest number of accidents occurred at speeds under 10 m.p.h., but in the aggregate the greatest amount of damage to property occurred at train speeds of 40 to 49 m.p.h. It is, however, observed in this connection that the number of train-miles having no casualties may also have been greatest in this range of speed. The bulletin closes with a brief comment on five accidents reported as having occurred at train speeds in excess of 80 m.p.h. Lightweight streamlined trains were involved in two of these accidents, and trains drawn by electric locomotives in two others. Three of these accidents were at level crossings, and the only fatality was the driver of one of the road motor vehicles involved. In the other streamlined train accident—a derailment—two passengers were slightly injured, whilst the last of the five 80-m.p.h. cases resulted when a part of the locomotive became detached. In this case, however, the train did not derail and no casualties resulted.

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The Sin of Sunday Travel

In the early days of passenger railways in Great Britain, objections to Sunday train services were no unusual feature, and more than one board of railway directors found it advisable to indicate in the accounts what proportion of the profits had been earned by Sunday trains, so that strict Sabbatarians should know what share of their dividend to renounce. Even today there are quite a number of places in Great Britain which are not served by Sunday trains or where the Sunday services are kept to a minimum, but this country can offer no example in restrictions so severe as those imposed by the Massachusetts legislature. An indication of these is revealed by an interesting document dated July 14, 1850, recently unearthed by our American contemporary, *The Mutual Magazine*. It explains that the original design of the Sunday train was to carry persons to church *only*, and proceeds to set out new regulations to prevent abuse of the facilities. These regulations provided that tickets for Sunday travel would be sold on weekdays only; persons purchasing such tickets would be required to sign a pledge that they would use them for no other purpose than church attendance; and no person was admitted to the carriage until he had passed the scrutiny of a committee. As late as 1860 the Massachusetts statutes provided that "Whoever travels on the Lord's day, except for necessity or charity, shall be punished by fine not exceeding $10 for each offence."

Railway Rates Policy

IN an interesting article on the railway representations to the Minister of Transport for the same freedom to be given in connection with the regulation of railway charges for the conveyance of merchandise traffic as is enjoyed by all other forms of transport, *The Economist* suggests that an air of mystification has been introduced into the matter by the absence of any authoritative statement of the manner in which the companies propose to utilise the freedom which they demand. It is well, therefore, to point out that the present system of rate control, with its intricate classification of merchandise and various provisions as to publication and undue preference, was introduced as a protection to traders when the railways had practically a monopoly of the country's transport. For many years, therefore, railway rates have been fixed on the principle that certain classes of traffic could afford to bear a larger proportion of overhead charges than other classes. This enabled low rates to be quoted for the traffics of the basic industries and so assisted in large measure the development of the country's export trade. With the swift development of the internal-combustion engine, the monopoly of the railway companies has disappeared, and the higher rated traffics are readily vulnerable to road hauliers whose rates are based almost entirely on the cost of the service and who are entirely free to discriminate between traders when occasion offers. With this complete change in the circumstances, the companies clearly have a moral claim to relief from the present crippling regulation of their charging powers. The extent to which they will secure this freedom remains to be determined. Can they be deemed to be acting mysteriously, therefore, because they refrain from explaining in advance precisely how they propose to use a freedom, the extent of which will remain unknown for some little time? Is it not rather prudent to decline to enter into potential obligations before being freed from present handicaps?

At the same time the railway companies have made it clear that, should they be granted the desired freedom, they have no scheme in mind for embarking upon a wholesale increase in rates, nor would they, in their own interests, seek to injure the development of trade by such means. Neither do they contemplate a rate war with their road competitors. The extent of any monopoly still possessed by the railways is extremely limited, even in the case of heavy traffics and, in any case, the ability of traders to operate their own transport under " C " licences is a factor of great importance in connection with any possible attempt by the railways to exploit any freedom from control. The same article proceeds into the realm of surmise when it suggests that the most likely result of the grant of the railway request would probably be a far-reaching agreement as to demarcation of function with the larger road haulage companies. Although such a discussion is largely academic at the moment, the railway companies certainly hold the view that co-ordination would be hastened if their rates structure was as free from control as the road rates structure, and they would welcome such a development. The Transport Advisory Council in its report on Service and Rates recommended that co-ordination between the various forms of transport should be brought about by voluntary agreements, but no effective steps can be taken in this direction until both rail and road industries are on the same footing as regards the control of their rates structure. The council also recommended that an opportunity should be afforded road hauliers of building up a rates structure for their own industry but as, in their present unorganised state, this will take considerable time, the railways feel they would be able to enter into voluntary agreements at a much earlier date if they were free to adjust their rates structure to meet present-day requirements.

It is scarcely correct to claim that the introduction of any such co-ordination arrangements would necessarily lead to a dual monopoly, for the reasons advanced in the companies' December memorandum, and because the traders' right to operate their own transport will still remain. Moreover, in such circumstances there is little doubt that both parties would be prepared to accept some form of rate control in the public interest. The suggestion is also made that any such co-ordination might lead to the community finding itself called upon to pay not only the prime cost of moving goods but enough to cover the full standard revenue of the railways and a substantial part of the cost of the roads. The railway standard revenues were fixed, however, in circumstances which do not now obtain and they have now little practical value. The whole theory of standard rates and charges being fixed at such a level as would yield, with other sources of revenue, a national standard revenue, has been destroyed by the pressure of the rates quoted by the newer form of transport, and it seems most improbable that any co-ordination of rates or functions could be agreed between these competing interests which would enable the companies to earn their standard revenues.

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The Future of Railways

IT is always refreshing to hear publicly expressed an unshaken confidence in the future of the railway, and when it is backed by such a wealth of sound reasoning as that which distinguishes the address summarised on p. 1087 of this issue, based on a wide experience of transport, the arguments are all the more convincing. The speaker was Dr. K. Remy, President of the Cologne Division of the German State Railway, in which the heaviest industrial traffic of all Germany probably originates; and his audience was the Fourth International Rail Congress, the proceedings of which were reviewed in our issue of September 23. That such earnest and detailed study should be devoted by manufacturing, using, and consultative experts from many nations to one single detail of railway equipment such as the rail was in itself an evidence to the speaker of the technical development in all spheres, greatly accelerated since the war of 1914-1918, which will assure the future of the railway as an indispensable factor in national transport. For Dr. Remy's firm conviction is that the maintenance by the railways of their position in the transport world must always remain in the realm of progress in engineering design and in the art of administration—that is to say, factors within their own control—rather than in the regulation from without of harmful competition.

Dr. Remy claimed that the railway has four decisive advantages, when these factors are taken collectively, over the competitors of the road and the air. They are the comfort of passenger services and a pre-eminent suitability for the mass transport of passengers and freight, coupled with a speed which is already high, and can be increased without sacrifice of safety or punctuality; the fourth factor is the high efficiency of the railway in defence. A further consideration in comparing air, road, and rail is that an aeroplane may need 100 h.p. and upwards to transport one passenger, and a powerful motor-car 10 h.p., whereas the engine of an express train is called on to exert less than 5 h.p. for every passenger conveyed. Although many years were taken in Germany to apply the lessons of the 1901-1902 experiments on the Marienfeld-Zossen military line, when a speed of 130½ m.p.h. was reached by specially-designed electric cars, or

the 93 m.p.h. reached with steam in the Bavarian trials of 1905, the day has now come when diesel units run regularly at 100 m.p.h., and steam trains at sustained speeds of 80 m.p.h.; furthermore, speeds up to 125 m.p.h. have been reached, not on special racing tracks, but over ordinary main lines with every limitation normally applied in the interests of public safety. Perishable freight traffic is being carried through Germany at speeds up to 50 and even 53 m.p.h.; but much new wagon construction would be necessary before a 60 m.p.h. standard could be attained, and Dr. Remy considered the further improvement and mechanisation of marshalling yards a much more important step for the immediate future in the interests of freight acceleration.

The announcement by Herr Hitler in 1933 of the great German system of high-speed motor roads was regarded by some as heralding the decline of the railways, but two years later came his statement that the railways must still be regarded as the channels for mass transportation of passengers and freight, together with his authorisation of many plans for railway improvement in Germany that had been carefully prepared during the time of depression. Thus the roads and the railways were rightly put on a complementary basis. As to management, Dr. Remy claimed that the Reichsbahn had given to the world an example of how a national public utility service might be run on business lines, as a commercially profitable undertaking; first by balancing the working costs of each department, and then by a system of accountancy which arrived accurately at the costs of every train-kilometre, and so provided a sound basis for tariffs, as well as a criterion of when and in what circumstances apparently unremunerative trains justified themselves in fact. For the future, railcar transport was indicated as the aim of the Reichsbahn for high-speed long-distance passenger services, fast urban and inter-urban services, and branches, with steam and electricity for mass transport of passengers and freight. Quadrupling of existing main lines, with the additional tracks specially adapted to high speed, is preferred, from the general utility point of view, to any costly system of entirely independent high-speed lines. The last five years of systematic national development in Germany has proved more than ever before the indispensability of her railways.

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The Colombian National Railways

OF the total length of the railways actually in operation in the Republic of Colombia, amounting to 3,280 km., 1,570 km., or 48 per cent. are worked for the State by the National Administrative Railway Council. The system so worked is made up of six different lines, each with its own local management under the control of the council, the accounts of each being kept and published separately. The aggregate figures for the whole system for 1937, now issued by the council, and including the Gamarra—Ocaña aerial cableway (47 km.) compare with those of the previous year as follows:—

	1936	1937
Passengers	5,432,289	5,597,947
Goods, tons	1,260,099	1,292,047
Train-kilometres	—	3,522,756
Operating ratio, per cent.	74·61	73·03
	$	$
Passenger receipts	2,664,947	2,876,049
Goods receipts	7,330,944	7,759,077
Gross earnings	12,379,168	13,285,766
Expenditure	9,236,430	9,703,305
Net earnings	3,142,738	3,582,461
Depreciation reserve	500,000	600,000

After providing for sundry net revenue items, insurance, and for a special credit to capital account of $536,100, against $184,148 in 1936, the proportion remaining to be credited to the National Government was $1,648,030, in comparison with $737,889 in 1936. These figures include the results of the aerial cableway and pier service, and the Ibague—Armenia road. The proportion credited to the National Government, according to Law 204 of 1936, goes to form a fund to be devoted exclusively to works of betterment on the railway system. During the year 57 km. of additional lines were brought into service, 20 km. on the Pacifico Railway and 37 on the Girardot system. Studies were continued (including aerial surveys effected by the Military Geographical Institute) for the projected link line to connect the Pacifico and Girardot Railways. A dredger was purchased in Holland, at a price of $285,000 (U.S.A. currency) for the port of Buenaventura. Four new Edwards railcars were placed in service on the Girardot line. The increasing use of railcars between Girardot—Tolima—Huila is denoted by the figures of the car-mileage, which have increased from 96,732 km. in 1935, and 154,502 in 1936, to 263,872 km. in 1937.

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New Zealand Government Railways

A PRELIMINARY statement regarding the position and activities of the New Zealand Government Railways in the year ended March 31, 1938, was published in THE RAILWAY GAZETTE of July 29, 1938, and the full report now available supplements the information therein given. The year under review was notable as producing a record in earnings without any increase in fares or freight rates. The administration besides working the railways conducts a number of subsidiary businesses such as Lake Wakatipu steamers, road motor services, refreshment, bookstall, and advertising services, departmental dwellings, &c. These businesses produced in the year under review a gross revenue of £1,042,361, against £887,047 in the previous year, and made with the gross revenue of £7,591,825 from railway operations, total gross earnings of £8,634,186. Gross expenditure on all services was £8,001,389, or 92·67 per cent. of gross revenue, leaving a net revenue of £632,797. Interest charges at 4¼ per cent. were £2,335,808, leaving £1,703,011 excess of interest charges over net revenue, compared with £1,405,896 at the end of the previous year. The figures in the accompanying table refer to railway operations only:—

	1936–37	1937–38
Miles open	3,320	3,323
Train-miles	11,868,083	12,777,852
Passengers, ordinary	8,284,956	8,069,018
Goods tonnage	6,212,907	6,847,974
Operating ratio, per cent.	91·81	96·05
	£	£
Passenger receipts	1,611,305	1,698,021
Goods traffic receipts	4,846,417	5,411,297
Operating earnings	6,903,604	7,591,825
Operating expenses	6,338,385	7,291,785
Net earnings	565,219	300,040

Although the number of ordinary passengers was 215,938 less, ordinary passenger revenue improved from £1,421,633 to £1,475,829. It may be remembered that two Easters fell within the previous financial year, whereas none occurred during the year under review. Standard fare traffic showed a decrease of 1·42 per cent. in numbers, but an increase of £35,978 (3·21 per cent.) in revenue, due to an increase in the average distance travelled. Revenue from parcels, luggage, and mails was £318,457, an advance of £12,931 or 4·23 per cent. Goods traffic receipts were the highest on record, and the average haul was 75 miles. The first year's operations at the new Wellington station show some remarkable figures. For the year ended on June 18 the total revenue from goods and passengers was £934,915, an increase of £273,474 (more

than 41 per cent.) on the aggregate of the old Lambton and Thornton stations for the previous twelve months.

Duplication of the North Island main trunk line between Auckland and Frankton Junction, a distance of 87 miles, is in hand, and work is being pushed ahead as rapidly as possible on the single-line portion from Ngaruawahia to Papakura. A duplication is also being carried out on portions of the main trunk line near Wellington between Plimmerton and Paekakariki, which is to be the terminus of the electrified section of line from Wellington *via* the recently completed Tawa Flat deviation. Published with the report are well-produced colour prints showing one of the new electric locomotives for use on the Wellington—Paekakariki electrified section, an electric multiple-unit train on the Wellington—Johnsonville suburban line, and an "Aotea" standard type of railcar for use on main lines and for long-distance running.

* * * *

Train Describers

A VERY interesting and most important feature of train signalling and operation was dealt with by Mr. J. E. Mott in his paper entitled "Train Describers," read before the Institution of Railway Signal Engineers on November 16. Next to the safe and regular functioning of the ordinary signalling equipment, affording block and interlocking protection, the rapid and accurate transmission of information concerning the class and destination of each train is perhaps the most essential part of our present day systems of working. It is one which has been growing in importance for some years, with the development of larger areas under one point of control and the interposition of numerous automatic block signalling sections between signal boxes. It is of interest to note that in 1836, Sir W. F. Cooke, one of the pioneers of telegraphy in Great Britain and the associate of Sir Charles Wheatstone, as recorded in THE RAILWAY GAZETTE for July 30, 1937, page 191, offered a design for a telegraph to the directors of the Liverpool and Manchester Railway, intended for signalling through a tunnel and said to have been capable of transmitting 60 distinct signals. The board, we are told—and it is hardly surprising—thought the apparatus "of too complex a nature for the purpose" and requested him to produce a simpler device. Though not covering a train describer, in any sense now understood, the proposal shows that the possibility of sending a considerable number of signals relating to train working was clearly envisaged over a century ago. Telegraphy on railways was at first limited to the transmission of ordinary worded messages, coupled with a few conventional signals, as block working came into use. Sometimes the class or destination of a train was indicated by bell code, developed by degrees into the well-known Clearing House code, or by dial signals given by the needle instrument. A few railways retained dial signals on their block instruments until quite recent years, as route description signals, while the London Chatham & Dover single-needle bell, a needle instrument in which every beat on the needle is accompanied by a stroke on a small bell, still survives on some sections of the Southern Railway, the routing of trains being signalled by code letters. No doubt one reason why some lines favoured dial signals was that worded messages could be sent on the instruments if necessary, an advantage before the telephone appeared in our signal boxes.

The development of alphabetical step-by-step telegraphs, such as those of Wheatstone, Breguet, Froment, and others, made it obvious that messages could be sent between signal boxes on similar principles, and it is not surprising that instruments embodying a pointer travelling round past inscriptions on a dial should have early made their appearance. Mr. Mott, indeed, cited such a device, now in the Science Museum, South Kensington, used on the South Eastern Railway in 1847, and constructed under Cooke and Wheatstone's joint patent of 1845 for step-by-step motion. In the discussion on Sir W. H. Preece's paper before the Institution of Civil Engineers in January, 1863, a 15-signal instrument was said to be in use on the Edinburgh & Glasgow Railway, while describing by means of single needles in combination was stated to be in use at New Street station, Birmingham. The two best-known step-by-step describers were no doubt that of Charles V. Walker, a Telegraph Superintendent of the South Eastern (inventor of a one-wire block instrument, first used at the opening of the Charing Cross Railway in 1864 and still used), which appeared in 1874; and that of Edward Tyer, patented in 1879. Both were widely used and are still seen. In other countries similar ideas were applied and devices produced, of which the so-called Jousselin bell, used on the P.L.M., and the pointer indicator of Siemens and Halske, seen in Central Europe, were typical.

Although other means of accomplishing the same object were devised and adopted here and there, no fundamental change in the position occurred in this country until the demand for the magazine system of working arose with the introduction of automatic signalling, concurrently with electrification, on the Metropolitan District Railway early in the present century, where the signal boxes at the key points were sometimes separated by a large number of block sections. Accurate indication of the destination of an approaching train was essential for the reliable and speedy handling of the traffic, and automatic notification to the public on the platforms of the same information was an important part of the scheme. It remains a prominent feature of the London underground lines, and has found its way to other countries. The conditions on the main lines, however, and on many suburban sections involve problems not usually encountered with the relatively simple underground and tube services, and which have formed the subject of considerable investigation and thought. The knowledge acquired in the development of automatic telephony, where the conception of electrical selection and storage of signals has seen probably its most remarkable applications, has been used in the construction of train describer equipment to meet these wider requirements with, as Mr. Mott demonstrated and practice amply confirms, excellent results. Circuits and equipment have been elaborated to meet the most exacting requirements even to the extent of making a permanent record of messages transmitted and the time and day when they were sent. The design of the detailed parts of the mechanisms has also been improved so much that failures have been all but eliminated, a very necessary feature, for valuable as a train describer is in aiding the working of our modern signal boxes, it is a decidedly annoying device if it gets out of order. It is almost better for it to stop working altogether than to send wrong information, especially if the latter appears on platform indicators and misleads the public. The train describer in its modern forms is indeed a fine example of circuit design and other electrical engineering features, and an admirable instance of how the progress made in one branch of an art can be successfully adapted to another. There is one operating official, however, who, to our knowledge, is not satisfied with any train describer extant. He wants the description of any particular train to appear on the illuminated diagram at the spot where that train is indicated at any instant, and hence to move along with it. We in turn, submit the problem to the rival designers of describer equipment. They might perhaps solve it by pooling their resources.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Comfort and Coach Weights

London, December 14

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In your issue of August 15 last you published a letter signed "Veritas" in which attention was drawn to the considerable increase that had been brought about in the weight of the L.N.E.R. Flying Scotsman, when the new train was introduced in July, by the additional amenities provided, such as a buffet car supplementing the restaurant cars, and by air-conditioning, and speculated as to how time-keeping would fare when the winter stops were reinserted in the schedule. In this letter, in the interests of punctuality, such modifications of the schedule were suggested as would adjust the demand on the locomotives to something like equality on the various sections of the run, these demands being demonstrably greater south of York than north of that point. Recently I have had occasion to travel by this train, and experience proves that, without this adjustment, timekeeping on this train has suffered. This is not, perhaps, surprising seeing that the previous minimum tare weight of the train—13 coaches of about 417 tons—has now gone up to a minimum of about 465 tons, and with "extras," frequently attached on the up journey, this may rise to 535 tons with 15 coaches, or nearly 570 tons with 16 coaches, to be worked on mile-a-minute schedules over lengthy 1 in 200 grades from Grantham to King's Cross and Grantham to York. In this connection is must be remembered that it is not only dead weight which is concerned, but also the considerable increase in electrical demand, for lighting, cooking, heating lavatory water, and forced ventilation, which is bound to cause an appreciable increase in locomotive power output.

On my first trip on the winter schedule with the new train and two additional vehicles—about 600 tons gross—it was not merely piloted from Edinburgh to York, but also, for the first time in my experience, from York to King's Cross, when a Great Northern Atlantic and a streamlined Pacific together lost 1¾ min. from York to Grantham, and ½-min. thence to London. On the next occasion, with 15 coaches (560 tons gross), the train was piloted down to York—as is generally the case, paradoxically enough, over the easier part of the run, when the load is 15 vehicles or over—but from York to Grantham, unpiloted, we lost 3½ min., with one permanent way slowing, and further time was dropped to London. The third run was after one of the new trains had gone into the shops for overhaul, and with 14 coaches of the old stock, 460 tons all told, an "A4" kept time without difficulty—42¾ min. net for the 44·1 miles from Darlington to York, 83 min. net for the 82·7 miles from there to Grantham, and 103 min. net for the 105·5 miles from Grantham to King's Cross. If punctuality is to be assured through the winter with the new train, when all the winter relaying work is in progress, it will only be possible either by the adjustment of times suggested, or by the uneconomic expedient of double-heading throughout, or by building still more powerful engines.

The same problem has arisen on the Great Eastern Section with the new Hook of Holland train, in which most luxurious stock, air-conditioning, and no fewer than *three* kitchens—two in the train proper and one in the Pullman section—have put the tare up from 443 to 483 tons, notwithstanding the fact that one 25-ton brake has been transferred from the previous Hook Continental to the Antwerp Continental. With the increased load there is also the greatly increased electrical demand, and at the same time a limitation of locomotive power that permits nothing heavier than the 77-ton "B17" 4-6-0s, with 54 tons of adhesion, over this very heavily graded route with its many and severe service slacks.

In the paper read before the Institute of Transport on December 12 attention was drawn to the progressively increasing weight of passenger rolling stock in this country, and the suggestion was made to Chief Mechanical Engineers that an essential in further acceleration was to arrest this tendency, if it is possible to do so without sacrifice of comfort. The experiences mentioned above confirm this contention, and show the difficulty even of maintaining certain present schedules with present-day loads. One cannot help thinking that increased coaching comfort calls for closer examination in advance of such problems as these by all departments and all areas concerned, when new developments are in contemplation, if efficient working is to be assured.

CRITICOS

The Aylesbury Branch Mystery

108, Vineyard Hill Road,
Wimbledon Park, S.W.19
December 14

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—There are a number of references to "Aylesbury Junction" in Wishaw's "Railways of Great Britain & Ireland" (2nd Edition, 1842). The position of Aylesbury Junction is stated to be 35¼ miles from London, but reference to the "Practical Railway Experiments" section shows this figure to be from Camden depot—one mile from Euston. In experiment No. 12 on the London & Birmingham Railway on August 26, 1839, where times were taken every ¼ mile, the distance from Camden depot to the junction is given as 35·25 miles, which places the junction in its present position, and provides an explanation of how the figure 35¼ m. came to be quoted in various guides.

In the description of the Aylesbury Railway, Wishaw mentions the curve at the L. & B. end of the line for which a radius of 12 chains is given. The present Aylesbury branch curves through 80° to join the main line, and for about 65° the curve appears to have a radius approaching very closely to 12 ch.

Mr. Charlewood remembers having seen indications of an old spur about half-a-mile west of Cheddington some fifty years ago. The line at this point adjoins Mentmore Park and I understand that when the house there was being built, in order to convey materials to the site a siding was laid at this point and afterwards removed. It is possible that this was the spur that your correspondent had in mind. The traces of a line at M.P. 35¼ I am at a loss to explain, and there is a rather curious fact in this connection. According to Wishaw "The worst inclination (on the Aylesbury Railway) is at the junction with the London & Birmingham Railway, where the terminal plane descends from that line at the rate of about 1 in 118, for a length of about seven furlongs," which denotes a difference in height of 39 ft. At the present time, the gradients on the branch for the seven furlongs from the junction in no way correspond to Wishaw's figure and the difference in height works out at about 28 ft. Also, the main line at M.P. 35¼ is about 12 ft. above the junction and thus corresponds almost exactly with the difference in height implied by Wishaw's figure.

That there never was a direct connection from the down main line is, I think, proved by the existence of the hill on which Cheddington Church is built. A line from anywhere near M.P. 35¼ on the main line, to the Aylesbury branch would have had to cut through the hill and this would have necessitated a cutting at least 25 ft. deep. If this line had been built on level ground, all traces might have vanished in 90 years, but a cutting such as would have been required here would not have disappeared entirely, and there does not appear to be the least trace of such a thing on the hill.

Regarding the leasing of the Aylesbury Railway to the London & Birmingham Railway, one of your correspondents implies in his letter that this did not take place until 1844. According to Wishaw, the Aylesbury Railway was opened to the public on June 10, 1839, and was leased to the L. & B.R. for five years.

Yours faithfully,

ERIC R. G. BARDSLEY

PUBLICATIONS RECEIVED

The Handbook of India (First Edition). Issued by the Central Publicity Bureau, Government of India Railway Department (Railway Board). Available in London at the Indian Railways Bureau, 57, Haymarket, S.W.1. 7½ in. × 5½ in. 84 pp. Illustrated. Complimentary.—This handbook contains much valuable information likely to assist tourists contemplating a visit to India. Attention is first drawn to the Indian Railways Publicity Bureau in the Haymarket and its organisation for giving information and assistance to tourists, including itineraries. After a list of the steamship lines between the two countries and their fares, are notes on the Customs, luggage clearing and forwarding agencies, coolie and conveyance rates, railway stations, and other information about the various ports of disembarkation.

A chapter is also devoted to general information regarding climate, clothing, and health in India; and to its peoples. Then one comes to information about air services to India—which might more conveniently have been included under "How to get to India"—mail services by air and land. There is, in fact, a noticeable lack of method in the arrangement of the chapters and subjects dealt with throughout. Between airways and mails, on the one hand, and Indian statistics and how to see that sub-continent, on the other, is interjected a chapter on Hyderabad, Deccan. The subsequent 30 pages are occupied by the conventional type of guide-book itinerary, and include illustrations of and notes upon Bombay, Rajputana, Delhi, Lahore, Kashmir, Agra, Lucknow, Benares, Calcutta, Darjeeling, Hyderabad (again), and other Southern Indian places.

Further useful information concerning railway facilities comes next, and its value is enhanced by good illustrations of the interiors of tourist and dining cars,and an air-conditioned coach. Finally, notes upon sport and the hill stations, and a couple of pages devoted to Burma, complete the volume. The illustrations throughout are excellent and the book is well produced and in good style, and it is, therefore, the more regrettable that it is not better arranged, and that the annoying practice of interspersing advertisements throughout the text has been followed.

Nordisk Järnbanetidskrift (Journal of the Nordic Railways). Index of contends for the years 1925-1937. Issue 8a, August, 1938. 48 pages, 9¼ in. × 6½ in.—Our contemporary the *Nordisk Järnbanetidskrift*, is the official organ of the Nordic (or Northern) Railway Association, which comprises the managements and staffs of the Danish, Norwegian, Swedish, and Finnish railways. Established 64 years ago, it deals with every aspect of railway working in the northern countries and publishes full information on the activities of the association, its congresses, discussions, and so on. It appears monthly. Articles are printed in Danish, Norwegian, or Swedish, as convenient, those dealing with Finland being in the last named, as Finnish would be intelligible to so few readers and Swedish is generally understood in educated circles in Finland. The present special issue contains a complete index covering the years 1925-1937 and shows how comprehensively the paper has treated the important questions with which the railways have been concerned in that time. There is also an author index. The issue is, of course, uniform in size with the monthly numbers of the *Tidskrift*, the Editor of which is Herr H. Tillinger of Stockholm.

Gauge "O" Model Railways.—Bassett-Lowke Limited, of Northampton, has this year published a new catalogue devoted to gauge "O" model railways. Clockwork and electric locomotives welcome a topical addition this time in the shape of a model of the L.M.S.R. non-streamlined 4-6-2 No. 6232, Duchess of Montrose. The steam range is increased by a six-coupled version of the popular *Enterprise* free-lance model, which improves upon its predecessor by the provision of a regulator handle in the cab. In the goods and passenger rolling stock sections the model railway enthusiast will find ample material for equipping his system whatever railway he favours. The maker's popular sherardized steel permanent way—with wood sleepers, chairs, and check-rails at points—is now offered at reduced prices but the same quality as before. Signalling and lineside accessories in general can be chosen from a range including some established favourites, but also with the addition of modern structures conforming to the railway architectural ideas of 1938.

Rail Road Man. By Chauncey del French. London: Macmillan & Co. Ltd., St. Martin's Street, W.C.2. New York: The Macmillan Company. 8¾ in. × 5¾ in. × 1¼ in. 292 pp. Price 10s. 6d. net.—Henry Clay French, who told this story to his son, began his career as a messenger and callboy on an American railway in the early 'seventies. It was a period when railway history was in the making in the Western States; when railway kings strove in the race to the Pacific Coast. Promoted to telegraphist, switchman, brakesman, and conductor, the railroadman works through stirring and romantic times, through the beginnings of mining booms and the foundation of new cities. Railway service in those early times was not a job for a weakling. It was before the introduction of air brakes and automatic couplings, and the brakesman, clambering over the roofs in all weathers, literally carried his life in his hands. Adventures with cowboys and hobos, accidents and narrow escapes, including one dreadful smash in which the railroadman nearly ended his career, form a continuous narrative. But throughout all his adventures, and with all his personal failings, frankly confessed, and his family troubles, borne sometimes with resignation, he is faithful to his own criterion: he strives always to be a "good railroadman." Throughout the book there are occasional glimpses of history, and the story of early railway enterprise in the U.S.A. does not lose interest as described from the viewpoint of the humble employee. The service record of the railroadman affords some indication of his adventurous life and also shows the tendency of the American, at any rate in those early days, to change his occupation. In this case it has provided material for a very readable book, and if there is no pretence to any great literary merit, there is at least a yarn on every page.

India - Europe Travel.—Thomas Cook & Son Ltd. has issued a list for travellers between India and Europe, giving details of steamer sailings to and from Bombay, airway services to and from Karachi, and other relevant information likely to be of assistance. Copies can be obtained from the firm's London and Indian offices.

Dust Respirators.—We have received from Siebe-Gorman & Co. Ltd., of 187, Westminster Bridge Road, London, a leaflet dealing with the Mark IV dust respirator. Designed at the suggestion of the Department of Scientific and Industrial Research, this respirator, it is stated, affords complete protection against the minute ultra microscopic particles which cause silicosis, asbestosis, and kindred ailments, such as are met with in mining, quarrying, grinding, and other industrial processes. The appliance is manufactured under Home Office licence, supervision and periodical testing, and each respirator has the Home Office Certification Mark.

Blowing and Exhausting Fans.—Keith Blackman Limited, of 27, Farringdon Avenue, London, E.C.4, has sent us a new catalogue of high efficiency blowing and exhausting fans, together with tables showing the capacities, speeds, and powers of the various types listed. Advantages claimed for these fans are quiet working, simple and robust construction, low costs, and a steady output. Two types of high efficiency fan are available: one with a single inlet for normal duties or double inlet for large volumes; and an alternative form recommended for situations exposed to hard wear or imposing difficulties of installation, which is constructed with a cast-iron housing and can have the motor either built into the driving side, or assembled with the fan on a cast-iron bedplate. A section at the end of the catalogue illustrates high-pressure turbo blowers and exhausters for use where higher pressures are required than can be obtained from the single fans.

THE SCRAP HEAP

NON-ARYAN

A bald-headed railwayman.

* * *

TRANSPORT MERGER

"It is hinted that Sir John Reith might be in control of the final merger, assisted by Lord Stamp, Lord Ashfield, and Mr. Runciman in rail, road, and air reorganisation."—*From "The Star."*

* * *

CHILDREN'S RAILWAY IN DONETZ BASIN

During the two years of operation of the Kirov children's railway at Stalino (Donetz basin), it has transported 135,000 passengers and trained 2,700 youthful railway workers—drivers, porters, despatchers, signalmen, and so forth.

* * *

BRITISH RAILWAY NAMES IN MELBOURNE

In the city of Oakleigh, a suburb of Melbourne, 7½ miles out on the south-eastern line to Gippsland, there are twelve adjacent roads all bearing the names of important stations, &c., on the L.M.S.R. and G.W.R. They are: Euston, Camden, Dalston, Earlstown, Preston, Carlisle, Bletchley, Willesden, Crewe, Rugby, Paddington, and Swindon Roads.

* * *

An engineering miracle is the Guayaquil to Quito line. This railroad up the Andes in Ecuador is a monument to North American railroad-building genius as exemplified by two Virginians, John and Archer Harman. Archer raised the funds to finance the enterprise. His brother, as chief engineer in charge of construction, made the dream come true. At Huigra, some 4,000 feet above the sea, is the grave of John Harman, who did not live to see the road entirely finished. Above Huigra is the scene of a notable engineering feat, the beetling "Devil's Nose," where the tracks climb upward in a daring zig-zag cut out of the mountain side.—*From "The National Geographic Magazine" of February,* 1934.

* * *

Referring to the forthcoming opening of the Sheffield & Rotherham Railway, the *Doncaster Gazette* on October 29, 1838, said, "fresh buildings will spring up in the vicinity of the railways; and, while the grass will grow over certain portions of the Great North Road, the lines of railway will be rendered smooth and bright by the rapidity of the immense transit of passengers and goods."

* * *

A man was recently arrested at Subotica, the Jugoslav-Hungarian frontier town, in the act of carrying off the railway station clock.

* * *

In papers on railroads in the *Scotsman* in 1824, it was forecast that "railway coaches might be made of such a breadth as to permit the passengers to walk in them; and that by joining one coach to another, and having open communications between them, the walk might be of such a length as to serve for recreation."

* * *

More than 1,500,000 commercial motor vehicles in this country (the U.S.A.) are now equipped with "governors" that limit drivers to a maximum speed of 40 miles an hour. One truck company has used them on over 2,000,000 miles of night driving, saving much gasoline, oil, and wear on its vehicles and with only four minor accidents since the installation.—*From "Collier's."*

* * *

Artemus Ward is stated to have told an American railway manager who refused him a free pass over the line, that he wasn't surprised, as the trains were so slow that they couldn't "pass" anybody.

* * *

THE "PICCADILLY PIPE"

With the view of ascertaining the opinion of the officials of the Great Northern Piccadilly & Brompton Railway regarding the suggestion that the new line should be called the "Piccadilly Pipe," a member of the *Daily Graphic* staff called on Mr. Gott, the passenger agent of the company. "I think the idea a good one," Mr. Gott said, "but I'm afraid it comes too late. Only on Wednesday an official communication was made to all our employees that they should refer to it as the 'Piccadilly Tube.' The neighbourhood of Piccadilly being the central point of the line, it is certainly advantageous to retain the name of that thoroughfare in the popular title. As to what word should be coupled to it—'pipe,' 'tube,' or any other, will, of course, rest finally with the public. However, until the public makes a definite choice, we shall call it the Piccadilly Tube."—*From "The Railway News" of December* 22, 1906.

* * *

A stationmaster telephoned to the minister to inform him that some goods had arrived for him. The minister replied: "Oh, yes, I was expecting a parcel of books. I'll send up for them." The stationmaster replied: "Very well; don't be long about it. They're leaking!"

Request and counter request outside Euston the other day

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

VICTORIA

Second Birthday of Spirit of Progress

The Spirit of Progress train completed its first year in service on November 23. Up to October 31 it had run 130,493 miles at a mean average speed of 50·87 m.p.h., despite 122 of the 190 miles covered on each single trip being single line, with frequent speed restrictions and a maximum permissible speed of 70 m.p.h.

New Stock for Melbourne-Adelaide Service

Mr. Clapp, Chairman of the Railway Commissioners, has announced that one of the most pressing needs of the department is a greatly improved service between Melbourne and Adelaide, to compete with sea and air services. A new train or trains and locomotives are to be specially built for this service, and the former is likely to be on the lines of the Spirit of Progress, except that it will include sleeping cars. The engines will be very powerful eight-coupled machines.

Redesigned " X " Class Locomotives

Four of the seven new redesigned " X " class 2-8-2 type locomotives are now in service. Generally resembling the twelve earlier engines of the same class, the new ones have a greater heating surface and other modifications. The modified Belpaire type firebox has 219 sq. ft. heating surface, the tubes and flues 2,364 sq. ft. and the superheater 540 sq. ft., giving a total of 3,123 sq. ft. The grate area is 42 sq. ft. and the superheater surface has been increased considerably. The boiler pressure is 205 lb. per sq. in., the highest in the State, and the tractive effort is 47,710 lb. inclusive of the booster. Four of the engines have new all-welded tenders carrying 9 tons of coal and 8,600 gal. of water. The remaining three have tenders spare from " S " class 4-6-2 type engines, now provided with larger tenders for the non-stop Melbourne—Albury run. The fabricated mild steel trailing trucks have already been described in THE RAILWAY GAZETTE.

TASMANIA

One Class Fare

The falling off in passenger business has made more acute a problem which has always existed to some extent, namely, the disposition of carriage stock on trains to provide adequately for both first and second class passengers. To overcome the difficulty, consideration has been given for some time past to the desirability of having one class only. There were several objections to the adoption of the proposal, one of which was that it would be difficult to raise the second class fare sufficiently to cover the loss on the first class fare. Another was to make up the deficiency in the second class accommodation as compared with the first class, and still another was the risk of losing a proportion of those first class passengers who were quite prepared to pay the first class fare in consideration of the extra comfort obtained. The proposal has therefore remained in abeyance up to the present, but the extension of the use of railcars has caused the subject to be revived. As a result of further consideration it has now been decided [as recorded on page 886 in our issue of November 18.—ED. *R.G.*] that dating from November 1, one-class fares only shall operate. This fare will be a 10 per cent. increase on the present second class fare, but for an extra fee of 2s., seats can be reserved for any journey in compartments now containing first class accommodation. As the opportunity arises the present second class accommodation will be improved and brought up approximately to the standard of the first class cars. The experiment being made will be watched with interest, not only in this State but elsewhere, where the same problems exist. The immediate result will be a reduction in the length and weight of passenger trains which should tend towards more economical working.

EIRE

Falling Beet Traffic

There are four sugar factories in Eire, one each in Carlow, Thurles, Mallow, and Tuam. In the production of this commodity the carriage of beet from the farms to the factories is a considerable source of revenue to the Great Southern Railways, whether the traffic is conveyed by train or by their road services, and the collection of the traffic from farm to railhead adds to the company's road receipts. There is keen competition with outside licensed hauliers for the carriage of all road traffic, and trouble has also been caused through carriers evading the Transport Act by posing as members of an association, to convey beet.

The manual labour entailed in digging the crop in winter, collecting, and transporting it to the nearest point attainable by a motor vehicle, is very heavy indeed, and this fact, coupled with the increasing cost of labour and freight, makes the production of beet less attractive than it was hoped it would be. Consequently the quantity of beet has diminished this season. The factories are only open for a certain period for the manufacture of sugar during which time all the beet must be delivered to them. This year the factories will close much earlier than last year as the quantity of beet offering is much less than in other years.

There are rumours that one of these factories will close next year, as the sugar content for beet in the district is not considered sufficient to render production attractive.

EGYPT

E.S.R. Earnings for 1937-8

The earnings of the State Railways for the financial year 1937-8, exclusive of river traffic, amounted to £E.5,412,309 as against £E.5,191,952, exclusive of £E.4,880 from river traffic, for the financial year 1936-7; an increase of £E.220,357, or 4·24 per cent. above the earnings of the previous financial year. This works out at 235 millimes a traffic train-kilometre, as against 238 millimes a train-km. in 1936-7, and £E.1,506 a km. of line open for traffic in 1937-8 as against £E.1,435 a km. in 1936-7. The route kilometrage open for traffic in 1937-8 was 3,601, as against 3,619 in 1936-7.

New Works, 1938-9

Now that the budget has been approved, it is possible to give the principal items of expenditure on new works that will be undertaken, which are as follow :—

(a) Full payment to be completed during the year :

Purchase of two diesel post and luggage vans for use on the Helwan line	£E.13,650

(b) Works to be begun this year and be spread over a number of years :

	Total Cost	Allocation for 1938-9
	£E.	£E.
El Mansura new station building	20,000	4,000
Remodelling El Arbain station	11,000	3,000
Sidi Ghazi-El Busseili new line	330,000	25,000
Telephonic traffic control for Lower Egypt ...	21,000	16,000

Separation of State Railway from General Budget

Some time ago, the Council of Ministers approved of the separation of the E.S.R., T. & T. Budget from that of the State.

It has now been decided to form a committee composed of the Assistant General Manager, E.S.R., the Controller, General Budget, in the Ministry of Finance, and the Auditor, E.S.R., T. & T. Department, to draw up the regulations to be followed after the separation.

Season Tickets

The total number of season tickets issued in 1937-8 was 52,697 as compared with 54,724 in 1936-7, a decrease of 2,027 or 3·84 per cent., but the receipts from this class of ticket amounted to £E.107,411 compared with £E.103,756 in 1936-7, an increase of £E.3,655 or 3·52 per cent. The respective figures for ordinary and kilometric season tickets on the main lines, and

season tickets on the suburban lines are shown below :—

Number of Season Tickets issued

	1937-8	1936-7	+ or −
Main line	7,439	11,575	− 4,136
Kilometric	10,547	9,356	+ 1,191
Suburban	34,711	33,793	+ 918
Total	52,697	54,724	—

Net decrease, 2,027 tickets.

Receipts from Season Tickets

	1937-8	1936-7	+ or −
	£E.	£E.	£E.
Main line	32,338	34,055	− 1,717
Kilometric	42,780	38,678	+ 4,102
Suburban	32,293	31,023	+ 1,270
Total	107,411	103,756	—

Net increase, £E.3,655.

INDIA

Cyclone Causes M. & S.M. Breaches

The District Transportation Superintendent, Bezwada, M. & S.M.R., wires from Samalkot that owing to a cyclone on the night of November 25, the Madras—Calcutta main line had been breached in several places. Transhipment was not then possible, but it was hoped that through running would be restored after seven days. Meanwhile, the mails were diverted *via* Wardha.

Dacoity on B.B. & C.I.R.

Twenty-five dacoits armed with guns are reported to have raided Daluda station on the B.B. & C.I.R. metre gauge section. A passenger train at the station was saved by the driver, who drove away without taking the line clear token. The dacoits, it is stated, began shooting at random, and a porter sustained serious injuries. The Assistant Stationmaster escaped in the melee with the station cash. The Stationmaster's house is reported to have been looted.

ARGENTINA

Crop Estimates

The third estimate of the maize crop for 1937-38, issued recently by the Ministry of Agriculture, gives a very clear indication of one of the principal causes of the present slump in the economic prosperity of the country and the falling-off in railway receipts. The full crop is estimated at 4,424,000 tons, as compared with 9, 10, and 11 millions odd in the three periods immediately preceding this one, an average over 10 years of 8,371,139 tons, and a previous lowest (in 1928-29) of 6,441,529 tons. It is satisfactory to record that up to the time of writing the weather has been distinctly favourable for the preparation of the ground, and sowing of next year's crop.

The second official forecast of the area sown with cereals and linseed for the year 1938-39, is as follows :—

	Hectares	Acres
Wheat	8,350,000	20,875,000
Linseed	2,690,000	6,725,000
Oats	1,350,000	3,375,000
Barley	830,000	2,075,000

In the case of wheat, the above figures show an increase of 250,000 hectares (625,000 acres) over those given in the first estimate, and 10,000 hectares (25,000 acres) more in the case of barley; while the area sown with linseed and oats shows decreases of 90,000 and 10,000 hectares (225,000 and 25,000 acres) respectively. Wheat sowings, as compared with those of last year, are 572,000 hectares (1,430,000 acres) or 7·4 per cent., higher; linseed shows a decrease of 152,000 hectares (380,000 acres), or 5·3 per cent., while small increases are recorded in the case of oats and barley.

GERMANY

Taking Over the Sudeten Lines

The official journal *Die Reichsbahn* publishes some particulars of the work involved in taking over the railways in the ceded Sudeten territory, particularly in those portions which passed under German control between October 10 and 15. It was decided to send a film party in advance of the new railway staff in order to make a record of the condition of affairs and enable some indication of the requirements to be sent to the Ministry of Transport as rapidly as possible, thus lessening the work of the staff in making written reports. The complete film, covering a tour of the Sudetenland, was ready to exhibit to the authorities in Berlin on October 20.

As a matter of fact, these reports by the staff could not have been drawn up without much difficulty, as the retiring Czech authorities had removed the furniture, writing material and other equipment in the station buildings and offices, down to the last electric light bulb in some cases. Almost every item of rolling stock had been taken away on some sections, while considerable damage had been done in places, railway and road bridges being destroyed and the permanent way seriously interfered with. In one place a specially made track-destroying machine was found abandoned.

A number of German locomotives were sent to the area, with other rolling stock, to enable traffic to be resumed as early as possible. The Sudeten-German staff remaining in the stations were all in the lowest ranks.

Advance inspection trains, propelling safety goods wagons in front, were sent out from the principal centres, such as Reichenberg, in order to test the condition of the track, bridges, &c., and set down the temporary staff where needed.

As far as possible, the essential shunting movements required to assist the local industries were effected as soon as engines could be provided. Now and then an engine left behind could be used. Much dislocation of business had, of course, taken place during the crisis, with the suspension of railway facilities. The Reichsbahn authorities set up motor bus services to provide temporary facilities, but some difficulty was experienced at first as all the petrol supplies had been taken out of the territory.

CHINA

Conditions under Japanese Control

Some light is thrown on the condition of the railways in Shantung and neighbouring provinces under Japanese control by missionaries and others. Permits from a Japanese consulate, endorsed by the local military command, are necessary for travelling. Most of the lines are in good order and bridges damaged or destroyed by guerrillas have been restored. They are, however, guarded by sand-bag block houses and every train carries a Japanese military guard; stations also are defended. No trains are run at night, but by day there are either one, two, or three trains each way daily, on the various sections of line, available for public traffic.

SPAIN

Public Claims Office

Under a Decree of the Burgos Government dated October 20, notified in the *Boletin Oficial* of November 8, The *Juntas de Detasa*, or Claims Boards, appointed to intervene in claims by the public for overcharges, damage or delays on the railways—referred to on page 202 in THE RAILWAY GAZETTE of July 29—will now have their sphere of action extended to cover also all claims by the public arising out of transport by road. For this purpose the Decree provides for the addition to the boards of another member, to represent road transport interests.

Railway Passes in Nationalist Spain

The Burgos *Boletin Oficial* of October 21 contains a Decree of the Ministry of Public Works regulating the issue of free passes and reduced fare tickets. No passes or reduced fare tickets may be issued by the railway companies except under an approved tariff, or with the authorisation of the Government. Passes and privilege tickets for railway servants and pensioners are excepted and may be issued as heretofore, and also those to destitute persons and charity organisations duly accredited. Annual complimentary passes may also continue to be issued to officials and employees of the State, whose duties may require them to travel, but in this case a list is to be submitted beforehand to the Ministry for approval. The Decree contains a list of those functionaries of the State entitled to free travel. When a similar Decree appeared some years ago the railway companies found themselves, as a result, giving more free passes than ever before.

BRITISH RAILWAY STATISTICS

"The Railway Gazette" monthly table for August, 1938, as compared with August, 1937, compiled from the Ministry of Transport Statement No. 225

Description	Great Britain*	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.
PASSENGER TRAIN TRAFFIC—					
Number of pass. journeys (ex. season ticket holders)	116,065,648	9,771,916	19,317,708	29,469,430	21,055,903
Increase (+) or decrease (−)	− 8,802,230	− 1,428,802	− 2,637,167	− 2,987,371	− 1,075,058
Passenger receipts (excluding season ticket holders)	£7,148,465	£1,029,182	£1,518,414	£2,437,498	£1,547,902
Increase (+) or decrease (−)	− £233,746	− £38,620	− £85,367	− £39,140	− £57,690
Season ticket receipts	£929,123	£53,995	£176,329	£239,379	£319,429
Increase (+) or decrease (−)	+ £3,195	− £2,114	+ £1,392	− £6,866	+ £10,646
Parcels and misc. traffic receipts (excluding parcels post)	£1,065,056	£194,313	£328,594	£396,189	£129,151
Increase (+) or decrease (−)	+ £23,394	− £2,137	+ £19,390	+ £7,471	+ £14
FREIGHT TRAIN TRAFFIC—					
Freight traffic (tons) (excluding free-hauled)	18,621,469	4,669,090	8,230,486	8,692,655	1,147,695
Increase (+) or decrease (−)	− 3,932,300	− 1,037,638	− 2,127,556	− 1,703,978	− 113,033
Net ton-miles (excluding free-hauled)	1,110,574,139	213,489,474	363,980,924	454,189,046	49,573,145
Increase (+) or decrease (−)	−210,665,971	− 41,160,401	− 79,960,189	− 79,812,551	− 5,909,371
Average length of haul (miles) (excluding free-hauled)	59·64	45·72	44·22	52·25	43·19
Increase (+) or decrease (−)	+ 1·06	+ 1·10	+ 1·36	+ 0·89	− 0·82
Freight traffic receipts	£6,238,317	£1,100,000	£2,006,218	£2,573,000	£360,713
Increase (+) or decrease (−)	− £869,798	− £180,000	− £290,124	− £356,000	− £23,401
Receipts per ton-mile	1·348d.	1·24d.	1·32d.	1·36d.	1·75d.
Increase (+) or decrease (−)	+ 0·057d.	+ 0·03d.	+ 0·08d.	+ 0·04d.	+ 0·08d.
Freight train-loads : Average train-load (tons)	119·53	127·02	122·32	117·56	101·02
Increase (+) or decrease (−)	− 9·41	− 12·17	− 10·47	− 8·23	− 5·50
Net ton-miles—					
Per train engine-hour	962·59	1,028·37	999·16	937·55	781·42
Increase (+) or decrease (−)	− 20·50	− 29·78	− 29·45	− 6·39	− 36·75
Per shunting-hour	851·05	759·16	923·32	906·98	565·40
Per total engine-hour	451·70	436·75	479·87	461·01	328·04
Net ton-miles per route-mile per working day	2,468	2,512	2,568	2,922	1,086
Increase (+) or decrease (−)	− 439	− 470	− 520	− 487	− 98
Wagon-miles. Total	329,857,965	60,953,818	114,390,803	137,759,271	16,474,722
Increase (+) or decrease (−)	− 42,869,923	− 7,344,056	− 16,580,763	− 17,368,985	− 1,253,122
Percentage of loaded to total	67·09	68·41	64·43	68·67	67·46
Wagons per train. Total	33·19	33·48	33·63	33·10	30·75
Increase (+) or decrease (−)	− 1·09	− 1·21	− 1·17	− 0·99	− 1·21
Loaded	22·27	22·91	21·67	22·73	20·75
Empty	10·92	10·57	11·96	10·37	10·00
Train-miles. Coaching—Per train-hour	15·43	14·52	14·70	14·68	18·22
Per engine-hour	12·28	11·42	11·29	11·20	15·31
Train-miles. Freight—Per train-hour	9·50	9·85	9·54	9·37	9·38
Per engine-hour	3·78	3·46	3·97	3·91	3·20
Engine miles. Total	49,955,815	7,892,481	13,833,249	18,458,372	6,996,837
Increase (+) or decrease (−)	− 1,710,433	− 329,969	− 639,067	− 737,750	+ 67,889
Mileage run by engines. Total train-miles—					
Coaching	27,217,522	3,692,816	6,538,991	8,969,013	5,382,005
Freight	9,938,874	1,820,572	3,400,822	4,161,911	535,769
Engine hours in traffic. Total	5,040,678	873,600	1,505,799	1,940,877	537,233
Increase (+) or decrease (−)	− 357,803	− 64,653	− 125,906	− 155,497	− 4,955
Shunting miles per 100 train-miles—					
Coaching	6·98	6·78	6·42	7·33	7·53
Freight	69·72	83·27	64·98	63·51	92·08

Passenger Traffic Statistics*: *Number of journeys, receipts, and receipts per journey (excluding season ticket holders)—August, 1938

Subject	Great Britain	G.W.R.	L.N.E.R.	L.M.S.R.	S.R.	Cheshire Lines	Liverpool Overhead	L.P.T.B.†	Mersey
Full fares—									
Pass. journeys	29,814,329	764,480	1,080,565	1,501,823	3,033,344	16,650	176,308	22,245,736	82,779
Gross receipts	£1,125,562	£114,354	£183,979	£181,447	£305,903	£3,223	£1,925	£314,402	£1,499
Receipts per pass.	9·06d.	35·90d.	40·86d.	29·00d.	24·20d.	46·46d.	2·62d.	3·39d.	4·35d.
Reduced fares—									
Excursion and week-end									
Pass. journeys	55,209,379	6,557,048	13,371,593	19,775,305	11,232,168	567,587	185,622	1,548,360	801,112
Gross receipts	£4,989,828	£771,971	£1,125,525	£1,950,746	£975,268	£52,129	£2,501	£37,618	£14,349
Receipts per pass. journey	21·69d.	28·26d.	20·20d.	23·67d.	20·84d.	22·04d.	3·23d.	5·83d.	4·30d.
Workmen—									
Pass. journeys	25,462,129	1,663,734	3,420,570	6,728,888	5,560,822	262,606	221,956	6,512,476	228,744
Gross receipts	£387,120	£25,963	£58,348	£114,275	£94,867	£4,752	£1,942	£74,161	£2,032
Receipts per pass. journey	3·65d.	3·75d.	4·09d.	4·08d.	4·09d.	4·34d.	2·10d.	2·73d.	2·13d.
Other—									
Pass. journeys	5,479,177	764,136	1,410,180	1,427,384	1,222,995	40,812	48,864	416,090	20,121
Gross receipts	£537,212	£87,557	£126,471	£144,140	£164,301	£3,639	£328	£3,799	£320
Receipts per pass. journey	23·53d.	27·50d.	21·52d.	24·24d.	32·24d.	21·40d.	1·61d.	2·19d.	3·82d.
Total—									
Pass. journeys	116,065,648	9,771,916	19,317,708	29,469,430	21,055,903	888,097	632,750	30,722,662	1,132,760
Gross receipts	£7,148,465	£1,029,182	£1,518,414	£2,437,498	£1,547,902	£64,226	£6,696	£429,980	£18,202
Receipts per pass.	14·78d.	25·28d.	18·86d.	19·85d.	17·64d.	17·36d.	2·54d.	3·36d.	3·86d.

* All standard gauge railways

† Includes passengers originating on the railway undertakings, and on the Whitechapel and Bow Joint Railway

THE FUTURE OF THE RAILWAY IN A NATIONAL TRANSPORT SYSTEM

Summarising an address by Dr.-Ing. K. Remy, President of the Reichsbahndirektion, Cologne, to the Fourth International Rail Congress at Düsseldorf, Germany, under the title "The importance of railways in relation to traffic economics"

DR. REMY began with a review of the conditions obtaining in the early years of the present century, when the railways ruled the field of transport almost unchallenged, and then traced the rapid increase in the competition on the roads and in the air from the time of the war onwards. The proportion of the whole volume of transport borne by any particular mode of transport is the measure of the latter's importance; and the fight for the maintenance of the position held by any one form of transport can never be solely the outcome of government control, although in national interests it may become necessary for government control to be exercised in the direction of maintaining a proper balance. However valuable co-ordination may be, however, the chief factors in the maintenance by the railways of their position in the transport world must always be progress in engineering design and in the art of administration—that is to say, factors which are under their own control.

Road Competition

As an illustration from post-war history of an attempt made, by the inauguration of motor transport across undeveloped country, to prove that the day of new railway construction had passed, Dr. Remy cited the first expedition made by the Citroën Company in 1923 with commercial lorries across the Sahara Desert from the Mediterranean to the Guinea Coast, linking up by a direct route two widely-separated sections of the French colonial empire. This was hailed as an enterprise which would do away with the costly necessity for building the long-desired Trans-Saharan railway. Since then fifteen years have passed, and two motor services are now in regular commercial operation across the Sahara. But their activity benefits a small number of passengers only; transport of luggage is limited and of heavy freight is out of the question; while, worse still, it is only during a period of four to five months in each year that the service is able to operate at all. Consequently the fight for the Trans-Saharan Railway is still as keen as ever.

Similarly in Germany, the announcement by Herr Hitler in February, 1933, of the forthcoming great system of German motor roads might have been taken to herald a decline in the relative importance of the railways, had not the Führer, on the occasion of the German Railway Centenary in 1935, announced that the German railways were still to be the channels for the mass transport of both passengers and freight, and, more important still, had he not authorised the carrying into execution forthwith of various carefully considered plans, formulated during the previous depression, for improving the railway facilities of the country.

Past Failures

Dr. Remy next pointed out how over-emphasised administrative control in the years before the war, which tended to put economics in the background, and, in all probability, the security afforded by what were thought to be monopolistic conditions, hampered railway development in Germany. As examples of failure in any way to apply the lessons of experiments which had proved successful, he cited the trials in 1901 and 1902 on the Marienfeld—Zossen military railway of the Siemens-Allgemeine Elektricitäts Gesellschaft electric cars, which attained a maximum speed of 130½ m.p.h., the test runs in 1904 with a steam locomotive of the Prussian State Railways up to 85 m.p.h., and of a specially-built Bavarian high speed steam locomotive, in connection with the Nuremberg trade exhibition of 1905, to a maximum of 93 m.p.h. So great were imagined to be the difficulties of improving the permanent way, bridges, and signalling sufficiently to adapt them for such speeds, that even as progressive a man as Garbe, the leading advocate of superheated steam for locomotives, regarded any attempt to establish higher speeds on rails than 100 km.p.h. (62 m.p.h.) as Utopian.

But in the great war the lessons learned as to the essential service rendered by railway transport were incontrovertible. Even though the motorcar rendered such service that, in certain engagements at least—the shifting of the Allied forces in the battle of the Marne, for example, or their reformation after the German advance on Amiens in the spring of 1918—history might have been written differently but for the use of motor transport, yet the same equally applied to the railways, especially in the mass movement of troops over greater distances. The German campaign of 1914-18 largely depended on the rapid transport of troops to and fro between the Western and Eastern fronts, which the railways conducted with precision and success. Since the war, the success of the internal combustion engine on the roads has suggested the adaptation of essential features of road transport to rails, even including the pneumatic tyre, but it has been proved by experience that there are limitations to any such adaptation, and the Micheline pneumatic-tyred rail vehicles in France, for example, have found few imitators.

Advantages of Rail Transport

Four advantages over all other forms of transport, which when taken collectively may be regarded as decisive, were claimed for the railway. They are:—

(1) Its speed, which is adaptable to all requirements, and can be increased if necessary without any sacrifice of safety or punctuality.

(2) The comfort of its passenger services.

(3) Its pre-eminent suitability for the mass transport of passengers and freight, and

(4) Its high efficiency in defence, for which no equally reliable substitute can be found.

Passenger Speeds

In the matter of speed the maximum possibilities of the railway have at times been unfavourably compared with those on the roads and in the air, but in this connection it is well to remember that railways have no racing test tracks over which the capabilities of their locomotives may be fully exploited; if they were so equipped, some very remarkable results might be achieved. In Germany, a test run in 1936 between Berlin and Hamburg with one of the streamlined Borsig 4-6-4 locomotives produced a maximum speed of 124½ m.p.h., and one of the three-car units with diesel propulsion reached 122

m.p.h.; among various striking features of these performances one at least was that they were achieved, not on a racing track, but over ordinary main lines within the limitation of every safety measure required for the public services.

A further consideration pertinent to any comparison of rail, road, and air speeds is that an aeroplane needs from 100 to 150 h.p. to transport one passenger, and a powerful motorcar some 20 h.p., whereas the locomotive of an express train is required to exert less than 5 h.p. for every passenger conveyed. With present equipment it is practicable on rails to maintain speeds of 100 m.p.h. with diesel transport, and 80 m.p.h. with steam locomotives, but although these speeds do not represent the limits attainable with present-day propelling machinery, further alterations to track and to signalling and control will be necessary before higher speeds can be introduced.

So far as Germany is concerned, possible improvements in track design on curves may now be regarded as exhausted, and apart from laborious attempts to improve the riding of the vehicles to permit higher speeds round curves (without recourse to such artificial assistance as that of gyroscopic stabilisers), the only practicable solution of the difficulty is that of special independent tracks for high-speed trains, comparable to the high-speed motor roads. It is from outside, rather than inside the Reichsbahn that such an idea is most strongly pressed, and, coupled with it, altogether novel ideas as to track construction, signalling, and traction. But the railway authorities would rather seek their goal in a simpler and more commercially profitable way, by the duplication of existing main lines, to make use of all the operating advantages of four-track routes, and at the same time by designing the layout of the additional lines in such a way as to permit the highest practicable speeds over them. Such additional tracks would communicate with the existing lines only at the more important junctions of the latter, and would avoid the unjustified complication and cost of an entirely independent high-speed rail system.

Fast Freight Service

In the matter of freight operation, high water mark in Germany is reached with the fast perishable services from Passau and Basle to Herbesthal, which enable poultry from the Balkans and fruit from Italy to be carried through to Ostend and Antwerp *en route* to London, at speeds through Germany from 50 to 53 m.p.h., with a good standard of punctuality. But the special safety measures regarded as essential for this service would not be economical if generally applied, and a general increase of freight speed would make it necessary to rebuild or replace a large proportion of the German freight stock.

A much less costly approach to an increase in overall freight speeds is that of modernisation of marshalling yards, where with suitable layouts, mechanisation, rail-brakes, and close study of the best systems of operation, an hour in the journey time of a wagon can be gained which, if gained instead in running times, would be a far more costly proposition. Nevertheless, a speed-up of freight services in running is very desirable, not merely for its own sake, but because it is the relatively lower speed of freight traffic over any given route that regulates its traffic capacity, and causes such problems in arranging for the faster-moving passenger traffic to overhaul the slower-moving passenger or freight traffic. It is here that the independent high-speed tracks would certainly offer advantages, as they would carry the fast passenger and fast freight trains exclusively, whereas the existing tracks would be used by slow passenger and freight trains, so allowing complete traffic separation. But no general increase of freight speed would be possible until a sufficient number of wagons was available capable of travelling safely at 100 km.p.h. (62 m.p.h.).

Traffic Control

An essential condition in acceleration of service is that operation shall be strictly punctual, that that punctuality shall be independent of weather conditions and equally effective both by day and by night, and that it shall be maintained in conditions of safety that are as near to absolute perfection as human ingenuity can make them. In Germany safety control on all routes over which the fastest services run—*e.g.*, the high-speed diesel units—is assured by the inductive A.T.C. system, the reliability of which has been proved. The latest mechanical and electro-mechanical interlocking systems control the working within station and junction limits. At all important traffic centres throughout the country level crossings of one track over another have been reduced to a minimum by means of flying and burrowing junctions on a very extensive scale, which both increase the safety of operation and facilitate the uninterrupted flow of traffic; but much has still to be done, in the interests of safety, in eliminating road level crossings over railways. Lastly, the substitution of automatic block signalling for manual signalling offers future advantages in increasing traffic density without any sacrifice of safety.

Passenger Comfort

The conviction was expressed by Dr. Remy that the comfort offered by the railway coach, owing to its track-bound properties and its relatively heavy weight—one realm at least in which weight is an advantage—will never be surpassed either by the road motorcar or the aeroplane. Had the financial situation in Germany permitted it, the many coaches 30 and 40 years of age which are still used on local services would long since have been replaced, as the psychological effect of comfortable stock in inducing travel-mindedness is fully realised.

The future aim on the German railways will be to use railcars of light-weight construction for branch line services, with due regard to traffic density; fast railcars for suburban traffic round great cities and inter-urban traffic in populous areas like the Ruhr; and high-speed units for the fast long distance traffic; steam and electrical operation will be reserved mainly for mass movement of passengers and freight, in which realm the railway still holds an unchallenged sway over all other forms of transport.

Mass transport of passengers does not necessarily mean carrying the maximum possible number of passengers per train, and in Germany the tendency until now has been to run as many long distance trains as economic conditions will permit, keeping them within reasonable weight limits in order to facilitate strict punctuality. In handling the suburban traffic of large cities the advantage of independent underground or elevated railways over tramways and buses needs no stress, but as regards outer suburban and interurban traffic, the Reichsbahn is sufficiently convinced of its value to have no intention of resigning all this traffic to competitors. The special fast service now run by the Reichsbahn through the populous areas of the Ruhr is evidence that even in difficult conditions the railway is able successfully to undertake a task of this description. As to mass transport of freight, the road motor can never develop into an economically justified competitor, owing to the low running costs of the railway.

Defence

Probably no military leader of a country possessing both good railways and good roads would be prepared to rest the defence of his country on road transport alone. The Prussian military command in the past waited ten years before it abandoned the movement of troops by marching alone, and fitted the railways into its system of

troop transport. Today, similarly, armies must depend mainly on a transport system which in every respect has been fully tried out, that can stand hard service, that does not depend on imported fuel, and that, though possibly hampered in its operations, cannot be vitally wounded or finally eliminated by a series of destructive attacks.

Management

In the realm of control, Dr. Remy claimed for the Reichsbahn that it has given an example to the world of how a national public utility undertaking should be run on correct business lines—that is, on an economically profitable basis. If before the war the pendulum in Germany inclined towards bureaucracy, with all its evils, post-war conditions compelled severe changes in this policy. The solution of the problem was found, first, by an examination and a balancing of the costs of each department of the railways, so establishing the overhead cost factor and the proportion borne by each department, and then by proper measures of accountancy, which made it possible to arrive with fair accuracy at the cost of a train-kilometre, a passenger-kilometre, and a ton-kilometre. These figures have provided the basis for fixing tariffs. The soundness of this tariff policy has recently had some striking proof in its application *de novo* to an entire country, which has taken place with the utmost smoothness on the incorporation of the late Austrian Federal Railways into the Reichsbahn system.

Rail-Road Co-ordination

A thorough investigation has been made by the German railway authorities of the possibilities of road services auxiliary to those of the railway, but with varying results. Working freight by motor lorries up to railway junctions, instead of bringing it by rail from the adjacent lines and branches, gave no acceleration sufficient to justify the cost involved. The question of mounting fully-loaded road trailers on flat railway wagons, and hauling these trailers between their sources of origin or destination and the railway is still under investigation.

Entire substitution of passenger bus services for rail services can be justified only in special conditions; for example, on lines carrying heavy mineral traffic, when the latter pays the major part of the overhead costs on the section in question, passenger traffic need be charged with its bare running costs only, and in that event to add the entire costs of a bus service to replace the passenger service would be uneconomical. On the other hand, a case was cited in which it paid to maintain a rail service on a local line by day, but by night, when the traffic was sparse, it was more economical to run buses than to keep stations and signal boxes open.

In the carriage of freight an entire substitution of lorry transport for rail transport would be out of the question; here the capacity of the railway wagon and the number that can be run in a single train are the decisive factors. Nevertheless, the advantages of door-to-door transport cannot be overlooked, and every possible means must be taken of developing it by containers, which are very popular in Germany, and by the running of fully-loaded road trailers on railway wagons. Finally, even though the motorcar may prove of immense value in opening up new countries, yet it is on the railway that those countries will ultimately depend for economic and reliable mass transport; of this principle the latest example is provided by Abyssinia, where the railway from Djibouti to Addis Ababa, and other projected lines, are to form a powerful transport reserve when the road-building programme is complete.

Present and Future Aims

Summarising his arguments, Dr. Remy enumerated the following points as constituting the present aims of the Reichsbahn management:—

(1) The adaptation of locomotive stock to the increased demands of the timetable.

(2) The construction of special rail units for ultra-high-speed passenger transport over long distances, with due regard to passenger comfort.

(3) The construction of rapid railcars for outer suburban and interurban services.

(4) The substitution on branch lines of railcars for steam trains, and the institution of more frequent services.

(5) Continued electrification of main lines, where economically justified by traffic considerations and Government economic policy, and at the same time with due regard to the interests of the power, oil, and coal industries.

(6) The introduction of automatic train control, to enhance safety of operation.

(7) Continued improvements to the track and bridges to permit higher speeds.

(8) The acceleration of freight services, first by improved marshalling methods, and then by the introduction of wagons suitable for faster running.

(9) The improvement of freight loading and unloading technique, and the avoidance of this work as far as possible by the use of containers and road-and-rail transport wagons.

(10) Supplementary use of motor vehicles in freight and passenger traffic where economically justified.

(11) The rebuilding of large stations with a view to more expeditious traffic handling.

(12) The improvement of line capacity by laying additional third and fourth tracks, and in such a way as to permit unrestricted high speeds over these tracks.

In conclusion, Dr. Remy stressed the fact that the last few years in Germany, with their five-year development plan, have proved more than ever before the indispensability of the railway, and so far from any thoughts of retrenchment, the operating officers of the Reichsbahn have been haunted by the fear lest they might not be able to keep pace with the constantly increasing demands for improved rolling stock and additional trackage.

The papers that had been prepared for the Fourth International Rail Congress witnessed to the striking developments that had taken place in this realm of railway equipment alone, and to the earnest desire of all those concerned in the manufacture, use, and study of the steel rail to contribute in their own sphere to the progress of railway engineering. What has happened in the post-war years affords ample proof that these technical developments in railway equipment and operation will not fail to come up to expectation in the years that lie ahead.

Despatching on the Petite Ceinture

An article by M. Baudez in the *Revue Générale des Chemins de fer* for November gives some particulars of the train despatcher's office for controlling the traffic on the Petite Ceinture line from Courcelles to Auteuil—Boulogne *via* La Rapée—Bercy. The Petite Ceinture, which carries the transit and intercommunication traffic between certain principal stations and junctions, shunting yards, and other railway centres in Paris, carries an extraordinarily fluctuating traffic, doubling itself at certain times and often varying to a large extent from one day to the next. Under the old working by the Ceinture Syndicate, the traffic was regulated, in all its details, by the stationmaster at the Evangile station. This station was attached to the La Chapelle marshalling yard when the Ceinture working was taken over by the North main line administration. A despatcher's office, with one chief and four assistants, was then set up to take full control of the working, with the usual telephonic communication with all the points of importance along the route. For each season of the year there is a typical timetable on which the actual movements are based, as the needs dictate. The working is stated to have given every satisfaction and enabled appreciable savings to be obtained.

AUTOMATIC SIGNALLING IN FRANCE

Extensive installations of colour-light signals in the Northern Region of the French National Railways

IN common with the other French railways, the C. de f. du Nord, prior to its incorporation in the S.N.C.F., equipped a number of main-line routes with automatic colour-light signalling and continuous track circuiting, principally between Paris and Calais, Lille, the Belgian frontier *via* St. Quentin, Longueau *via* Ormoy-Villers, and on the lines in the coal mining areas; also, those connecting its own system with that of the Est, from Calais and Dunkerque through Lille and Valenciennes, together with the Paris suburban lines. In the installation made some years ago between Creil and Persan-Beaumont, semaphore type signals were used, but the colour-light signal has now been adopted for all further work. In September, 1935, the section between Creil and Longueau, but excluding those stations, a distance of 75 km. (46·6 miles) was put in service, and as it presents features of special interest, we reproduce the following leading particulars from an article by MM. Demaux and Marthelot in our contemporary the *Revue Générale des Chemins de fer*.

Adoption of One-Light Indications

Although the code of signal aspects then in force, but superseded last year, prescribed two lights for a stop or caution indication, it was decided to instal signals giving one light per indication, to save expense and simplify the final change when the new code came into general application. Automatic signals were therefore arranged to show a red light for " stop and proceed," a green one for " caution," and a lunar white light for " proceed." The change to yellow for " caution " and green for " proceed " was then made by merely altering the colour screens behind the lenses—all of which are of clear glass. Although these indications did not precisely correspond with those seen by the drivers elsewhere on their run, no difficulty was experienced, as the light signal indications were sufficiently distinctive to enable the drivers to tell which section they were on, and isolated colour-light signals, mixed with the ordinary pattern were not encountered.

Fig. 2 illustrates a three-aspect automatic signal. A small lunar white marker light, known as the permissive light, is mounted under and to the left of the main lenses, and the post carries the signal number and a plate marked " F " (*franchissable* = passable), also serving to indicate the character of the signal. A hand switch, normally sealed, enables the signal to be put to danger in emergencies, the " caution " indication then appearing on the signal in the rear. The red light appears in the centre of the signal, the yellow below, and the green above. Except on the four-track section between Boves and Longueau, 4 km. (2·48 miles), where such working is considered inadvisable, owing to possible confusion if lamps should fail, approach lighting has been adopted, a signal lighting up when a train passes the one in the rear.

The working can be understood from Fig. 1, representing three block sections and relative equipment. The circuits are so simple that no special explanation is neces-

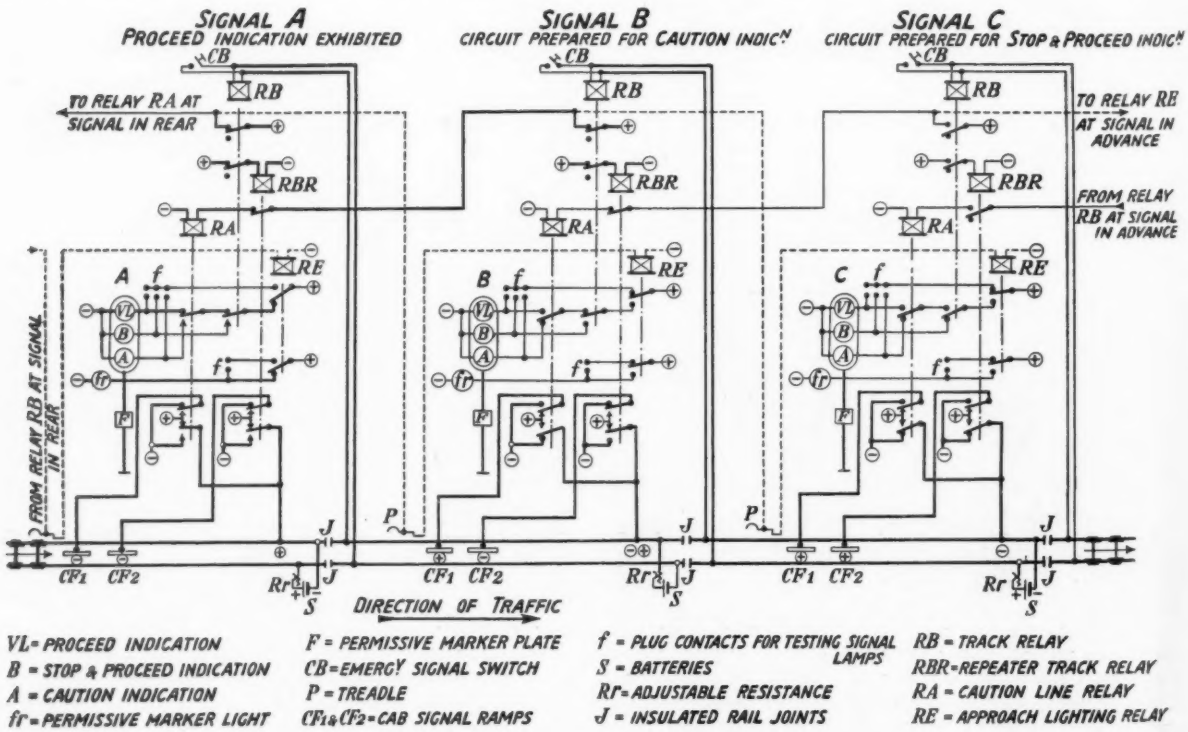


Fig. 1—Electrical connections for automatic signals

Fig. 2 (left)—Three aspect automatic signal with marker light and "F" plate. Fig. 3 (centre)—Semi-automatic signal protecting a station, with extra red light, call-on light and indicator. Fig. 5 (right)—Lower portion of home signal post, showing "F" and "NF" indicator, telephone, and signal number

sary, but there are one or two features deserving notice. In order to ensure the approach lighting taking effect in the unlikely event of the track relay not dropping—such a failure has not yet been experienced on this section—a treadle has been installed 150 m. (164 yd.) in the rear of each signal, in the circuit of the approach relay. Shortly in the rear of each signal are two cab signal ramps, the working of which is referred to below.

Signal Spacing and Spacing Protection

The minimum length of block section on the level is 1,400 m. (1,531 yd.), and 1,700 m. (1,859 yd.) on down grades steeper than 0·4 per cent. As far as possible the signal spacing has been kept regular, but differences have had to be made in places to obtain a good view of a signal or to fit in with station arrangements. The sections are shorter than when the Lartigue block was in use and the running of the trains has been noticeably improved.

Stations are protected by the preceding automatic signal, controlled when required from the station and exhibiting in those circumstances a small red marker light instead of the white one, placed vertically below the ordinary red light. The white light appears at all other times. Instead of a fixed plate, the signal carries an electric indicator showing the sign "F" (*franchissable*=passable) or "NF" (*non franchissable*=not passable), the former being seen when the white marker light is—or ought to be—displayed. In the event of a signal being out, or showing a partial indication, the driver consults this indicator and acts accordingly. A "call on" indication is provided by a lunar white flashing light mounted at the top of the signal (Fig. 3) and controlled by the station official. There are as yet no facing junctions to protect in this installation, but there will be at Clermont and Breteuil in due course, and elsewhere as automatic signalling is extended. Provision will then be made to exhibit the two yellow lights of the new signal code called *rappel de ralentissement* (reminder of speed reduction).

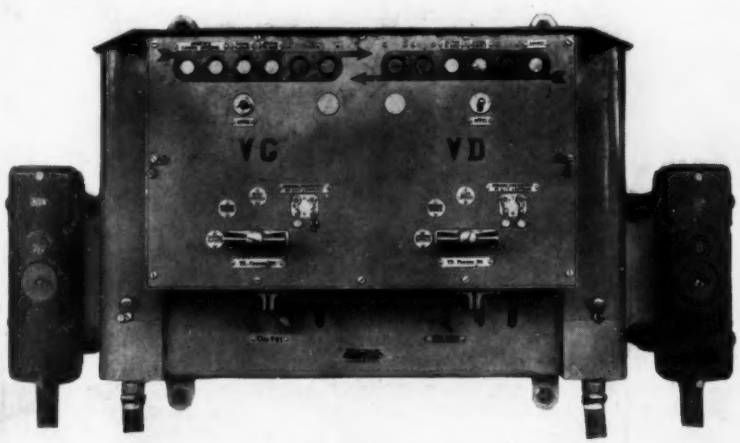


Fig. 4—Electro-mechanical key interlocking apparatus used at stations

Station Apparatus

The stations on this section being fitted with the Bouré key interlocking system, widely used on the Nord, that apparatus has been incorporated in the new signalling scheme by means of

electro-mechanical key equipment, seen in Fig. 4. The signals for the *voie de gauche* and *voie de droite* (*i.e.*, the lines *from* and *to* Paris respectively) on either side of a station are each controlled by a three-position handle, normally standing at "Signal off." The working is then purely automatic, and the white marker lights and "F" signs are in circuit.

To block a line and allow points connected with it to be worked, the appropriate handle must be brought to the position "Keys free," passing by "Signals on," which it can do only if the controls for the red indication in the home signal are correctly established. The removal of any key, of course, locks the handle. With all keys again in place the handle can be returned to "Signals off." A push-button enables the absolute stop indication to be turned into permissive stop, or the call-on signal to be shown. Approach locking of the handle is provided with sealed release for emergencies to prevent disturbance of signals and points in the face of a train. The two track sections in rear and the one in the station are indicated, but the one in advance only if the starting signal is not visible from the apparatus location; the "stop" and "caution" indications in starting signals are not approach lighted and serve, therefore, as track indicators. An alarm sounds when trains are approaching or if a home signal goes unexpectedly to "stop." Certain such signals have telephones communicating with the station, as seen in Fig. 5.

Cab Signal Apparatus

The apparatus generally used on the Nord, described

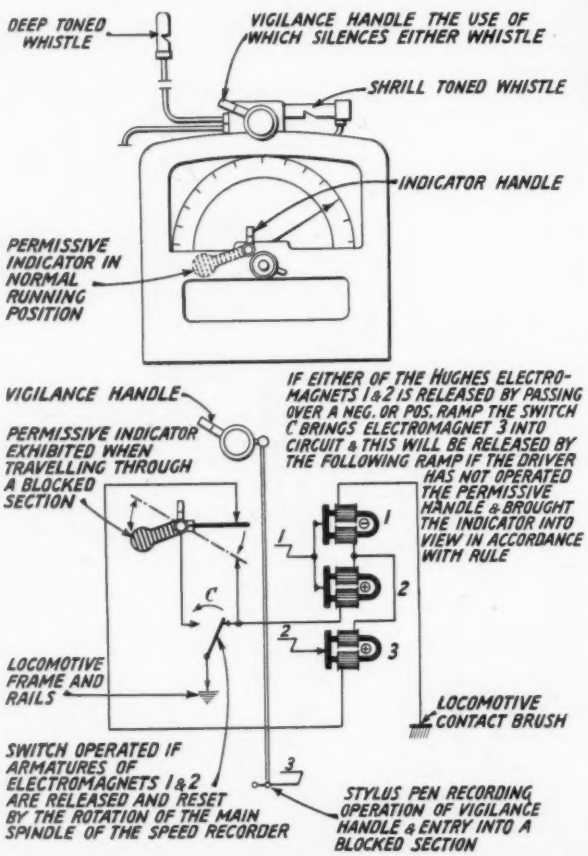


Fig. 6—Diagram of improved cab signal apparatus, Ledard system

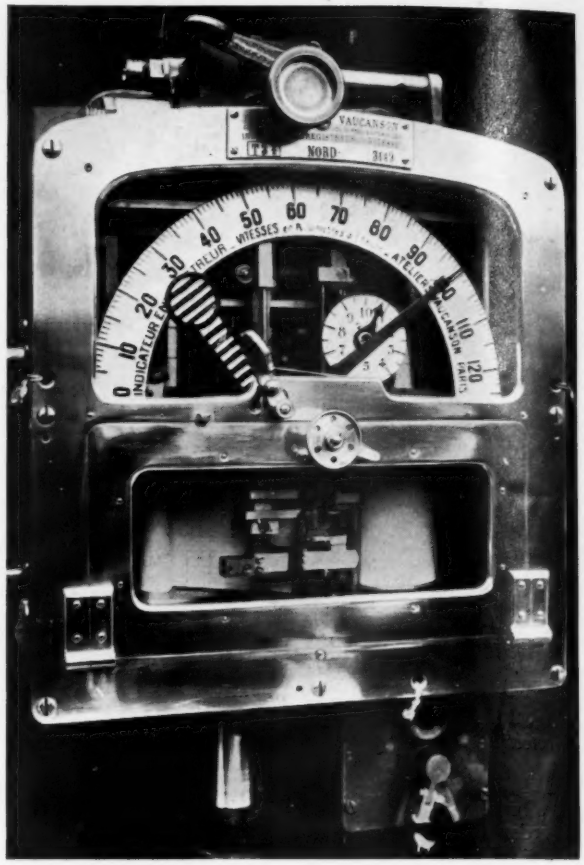


Fig. 7—Flaman speed recorder on locomotive showing permissive indicator displayed (train running in a blocked section)

in the article on French signalling in our issue of December 28, 1934, has been modified to give three indications to the driver, and to meet the special requirements of "stop and proceed" working, to designs due to M. Ledard of the Locomotive Department. Two contact ramps are placed just in rear of each automatic signal, with a third one at station home signals, acting upon the engine apparatus shown in Figs. 6 and 7, and producing the following audible warnings in the cab:—

Proceed	Two short blasts of compressed air.
Caution	Shrill-toned whistle.
Entering Blocked Section (after stopping and operating permissive handle according to rule)	Shrill-toned whistle twice.
Over-running Automatic signal ..	Shrill-toned, then deep-toned whistle.
Over-running Absolute Stop signal	Shrill-toned, then deep-toned then shrill-toned whistle.

(All these operations are recorded on the chart of the Flaman apparatus.)

Before the driver enters a blocked section he has to operate the permissive handle, which brings into view an indicator resembling the semaphore arms used in the old manual block. This causes the horizontal mark on the speed recorder band to appear a little to one side of the normal line, until a clear signal is reached, and the distance travelled under caution is thus permanently indicated. Guards are no longer required to issue permissive

forms to the drivers, nor to protect their trains in rear at any time, unless derailed.

Constructional Details

The light units, except the permissive markers, are mounted on the background plate, the latter being carried adjustably on a lattice post, which bears the number and marker plates, or, at station home signals, the "F" and "NF" indicator, with telephone in certain cases. The main running lights are 210 mm. (8·27 in.) dia., and the extra red light 160 mm. (6·3 in.) dia. The former have 3 degrees horizontal spread and 1 degree vertical as a rule, the latter 4 degrees in each direction. On curves, the horizontal spread is increased in the main lights to 7 degrees. A total reflection prism is used to provide a close-up indication. The white markers are 90 mm. (3·54 in.) dia. with 9 degrees horizontal and 7 degrees vertical spread. Clear glass lenses are used, with sheet glass colour screens, and an inclined clear glass screen is placed in front of each aspect to eliminate phantoms. The lamps are single filament, 6-volt 9-watt, or 3-watt for markers. The drivers have declared themselves entirely satisfied with the clearness of the aspects.

The track equipment does not present any particular novelty. Two kinds of insulated joint are being used, neither of which require collets in the rails. Both ordinary channel pin bonds and welded bonds are in use. The track relays are of 4 ohms, the line relays of 250 or 500 ohms resistance. Primary battery is used on approach lighted sections, but for permanent lighting and in certain stations energy is obtained from supply mains, with accumulator or primary battery standby. Bare line wire is used for the most part, but at selected points cable has been installed. Relay and apparatus shelters are of concrete.

Since coming into service on September 14, 1935, the installation has afforded complete satisfaction. The plans were prepared and the apparatus installed by the company's staff, who also made the key interlocking apparatus and certain outside equipment.

Further Installations

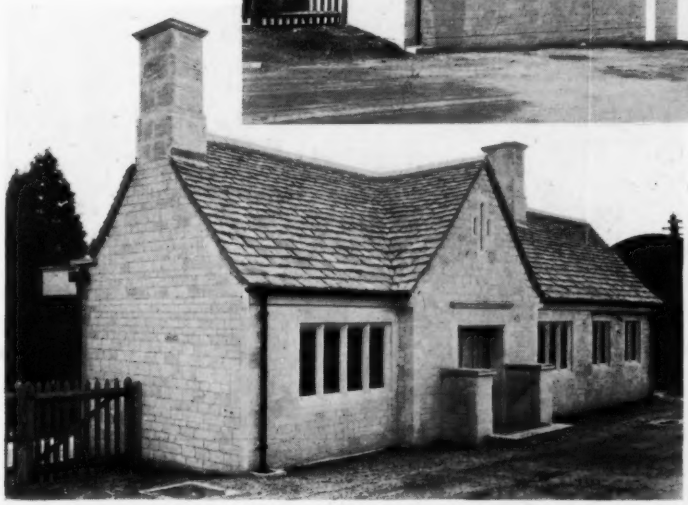
Since the publication of the article from which the above particulars were taken, additional sections of automatic signalling have been brought into service in what is now the Northern Region of the French National Railways, the work completed by November, 1938, comprising, in addition to that between Creil and Longueau, above described, the following sections: Longueau and Arras, Creil and Tergnier, Longueau and Amiens, Courcelles (Ceinture) and La Rapée-Bercy, Valenton to Juvisy Yard, making a total of 509 track kilometres (316 track miles).

Additional sections are in hand, or are being worked out, between Tergnier and Le Cateau, Paris and St. Denis, Le Cateau and Quévy *via* Erequelines, Amiens and St. Roch, and Arras and Lille, amounting to 381 track kilometres (237 track miles). The cab signalling arrangement described is, we understand, not that which the French National Company proposes to adopt for general service throughout its system.

Cotswold Style for Cotswold Stations

Stations on the Cheltenham—Banbury line in the Cotswolds reconstructed by the G.W.R. to harmonise with local architecture

Above: Bourton-on-the-Water



Left: Stow-on-the-Wold

(See editorial note on page 1076)

A UNIFIED COLONIAL RAILWAY SERVICE?

By the author of the original article

WHEN putting forward in THE RAILWAY GAZETTE proposals for a closer measure of Colonial railway unification in respect of supervisory staff and technical practice, it was hoped that constructive criticism might follow. Articles and letters dealing with the proposals have appeared in issues of THE RAILWAY GAZETTE for May 13, July 15, August 5, August 19, and September 23.* It is, perhaps, time to comment.

The objects of the proposed scheme were:—

(i) To ensure that supervisory railway officers in the various Crown Colonies had positive opportunities for transfer on promotion which would carry an emoluments increase in each case. (This is not always the case as things are, owing to each railway having been a law unto itself in fixing its salary scales. Housing, passages and pensions also call for closer unification). The best means of securing this appeared to be the grouping of railways having similar characteristics governing the working value of their supervisory posts, and the framing of a schedule providing for a salary increase in the case of all transfers from any group upwards.

(ii) To bring about by the regular exchange of financial, technical, and operating data in relation to practice and performance *as normal procedure* and to encourage standardisation. In this connection, the relation of locomotive cylinder stroke to diameter is an item. Another is the design of vehicle bogie. While size of wheels and gauge of track vary, there is no technical reason why the general form should do so. The use of mechanical methods of statistical production; the question of whether Colonial railways require signalling; the policy of locomotive and vehicle retirement when their cost per ton-mile becomes uneconomic—there are many such items which call for standardisation in practice.

Your correspondent of July 15 read an absurdity into the original article and proceeded to demolish it. That the proposed grouping was intended to bring about similar local practices among railways thousands of miles apart was so improbable that your correspondent might have been warned to look deeper. The letter in your issue of August 5 corrects the misunderstanding. Your correspondent of July 15 gives calm consideration to the project, in which he sees possibilities and in regard to which he makes proposals. He suggests, in addition to the unification scheme originally proposed, a railway adviser to the Colonial Office; a proposal which never occurred to the writer of the original article and with which he does not agree. Your correspondent of September 23, however, seizes upon this with savage ferocity, imputes it without evidence to the original author, and proceeds to fight the shadow.

THE RAILWAY GAZETTE is read wherever there are railways and by various nationals who operate Colonial railway systems. It is felt that calm examination of a long-range policy for a closer measure of Colonial railway unification has logical possibilities and need cause no Colonial railwayman "to writhe with shame," as suggested by your contributor in your September 23 issue.

The British have already led the world in railway co-ordination; as witness the railway grouping in Great Britain and the standardisation of locomotive design on the railways of India. Is it too much to suggest closer attention in this direction to the Colonial railways? What is French and Dutch practice in this respect?

The suggestion of *esprit de corps* in a unified Colonial transport service has been questioned. Consequential extinction of disinterest and apathy in the achievements of Colonial railways other than that in which an officer is serving, would seem to be worth while.

* Articles and letters debating this subject have appeared in our issues of May 13, July 15, August 5, August 19, September 23, and November 25

A portion of the disused Brusselton incline on the Stockton & Darlington Railway, showing stone sleeper blocks and remains of early rails

NEW 2-10-4 C.P.R. LOCOMOTIVES

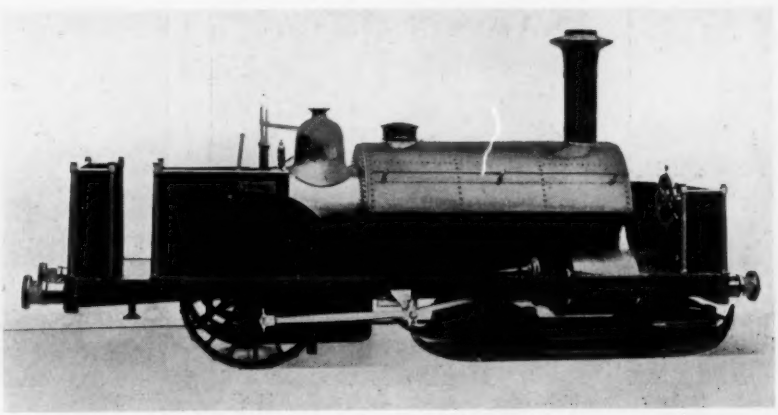
These engines are a development of the successful Selkirk type used on the Rocky Mountain section of the Canadian Pacific Railway

TEN new engines of the Selkirk or 2-10-4 type have been built this year for the Canadian Pacific Railway. Designed by Mr. H. B. Bowen, Chief of Motive Power and Rolling Stock to the company, this new streamlined " T.1.B." class locomotive is a modification of the 20 engines of the same general type built in 1929, that have proved so successful in service between Field, B.C., and Revelstoke. But as higher speeds are now demanded on the Rocky Mountain section, the 10 new engines represent considerable modification and development of the earlier type.

Weighing practically 200 tons, developing 5,000 h.p., and having a tractive effort of 90,000 lb., they are the heaviest and most powerful locomotives in the British Empire, and are capable of hauling all-steel 12-car trains, weighing 1,050 tons, up 1 in 45 gradients, said to be the equivalent of handling 12,000 tons on the level. The cylinders measure 23-in. dia. × 32-in. stroke, the coupled wheels have a diameter of 5 ft. 3 in. and a booster is incorporated in the trailing bogie truck. The working pressure is 285 lb. per sq. in. Oil fuel is used; the tender has a capacity of 12,000 gal. of water and 4,300 gal. of oil.

Equipment includes type " E " superheater, multiple poppet-valve regulator, one-piece cast-steel frame and cylinders, flange lubricators, a tangential steam drier, a cab-window defrosting device, and steam rail washers.

An interesting feature in connection with the new engines is that a special form of snow plough will be fitted to them in the winter instead of the ordinary type of pilot. It will be used to remove light snow encountered in normal train-working, and will supplement the conventional type of rotary plough propelled by locomotives specially deputed for the task.

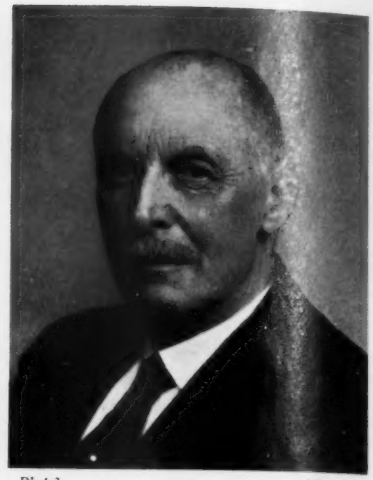


Model in the Science Museum, London, of the locomotive "Rurik" built by Neilson & Co., which worked between Petersburg and Cronstadt in 1861 on the ice of the River Neva

Elliott] [& Fry

Sir Alexander Rendel, partner 1856-1918

Sir Frederick Palmer, partner 1913-34



Photo] [Vandyk

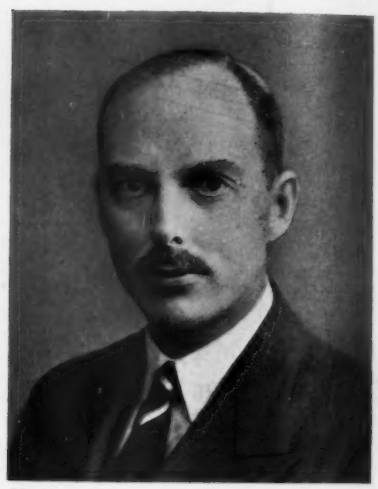
Sir Seymour Tritton, partner 1912-37

Photo] [Vandyk

Mr. E. J. Buckton

Elliott] [& Fry

Mr. Ralph Strick



Photo] [Lafayette

Mr. Julian S. Tritton

Photo] [Lafayette

Mr. Asa Binns

Wykeham] [Studios

Mr. R. L. Ray

Elliott] [& Fry

Mr. J. M. B. Stuart

PARTNERS (PAST AND PRESENT), AND CONSULTANTS, MESSRS. RENDEL, PALMER & TRITTON

(*See page* 1100)

RAILWAY NEWS SECTION

PERSONAL

Mr. R. A. Cary, M.P., has been appointed by Captain Austin Hudson, M.P., Parliamentary Secretary to the Ministry of Transport, to be Parliamentary Private Secretary in place of Mr. A. C. Crossley, M.P., resigned.

G.W.R. Appointments

The following appointments are announced, effective as from January 2, 1939:—

Mr. Gilbert Matthews, Divisional Superintendent, Swansea, to be Principal Assistant to the Superintendent of the Line.

Mr. W. S. H. Williams, Divisional Superintendent, Gloucester, to be Divisional Superintendent, Swansea.

Mr. S. G. Hearn, Assistant Divisional Superintendent, Newport, to be Divisional Superintendent, Gloucester.

Mr. W. R. Stevens, Chief Clerk to Divisional Superintendent, Gloucester, to be Assistant Divisional Superintendent, Newport.

Mr. F. O. Veltom, Junior Assistant to Divisional Superintendent, Swansea, to be Chief Clerk to Divisional Superintendent, Gloucester.

Mr. G. Bishop, whose appointment to succeed Mr. F. P. Watts as Assistant Southern Divisional Superintendent, Southampton Central, Southern Railway, was recorded in our issue of December 16, entered the service of the former S.E. & C.R. in 1910. After service at various stations and on the relief staff until 1910, he was transferred to the Train Running Department in the office of the Superintendent of the Line, and subsequently to the office of the Northern District Superintendent at Chatham. Mr. Bishop was transferred to the London District Traffic Superintendent's office in 1912, becoming Chief Clerk there in 1916. He was promoted to be Assistant to the Northern District Superintendent in 1917, and after grouping went to Dover as Assistant Eastern Divisional Commercial Manager, Southern Railway. Mr. Bishop returned to London on being appointed Assistant London East Divisional Superintendent in April, 1930, and in April, 1936, took up his duties as Assistant for Rates and Fares, Commercial Superintendent's Office, which he relinquishes on his new appointment to Southampton. (A portrait and biography of Mr. Watts are published on the next page).

Mr. A. F. Harvey, F.C.H., General Manager, Eastern Bengal Railway, is President this year of the Indian Railway Conference Association, the autumn session of which is reported on page 1103. Mr. Harvey was born in 1884 and received his theoretical training at the Royal Indian Engineering College, Coopers Hill, where he was first in his year, gained three scholarships, and the O'Callaghan gold medal; and was also awarded the F.C.H. Mr. Harvey joined the Eastern Bengal State Railway as an Assistant Engineer in 1905, becoming Executive Engineer in 1913. He also held the appointments of Assistant Agent, and Officiating Deputy Engineer with that system, but in 1924 was transferred to the Railway Board as Assistant Secretary, later becoming Deputy Director, Stores. In 1925 Mr. Harvey was appointed to officiate as Technical Officer to the Railway Board, but in 1929 returned to the E.B.R. as Engineer-in-Chief, Surveys and Constructions; becoming Officiating Deputy Chief Engineer nine months later. Between then and 1932, when he was confirmed in that post, Mr. Harvey officiated several times as Chief Engineer. In 1932, also, he was made Director of Civil Engineering with the Railway Board, and in 1934 was posted Chief Engineer, E.B.R., preparatory to becoming Agent in October, 1935.

Mr. A. F. Harvey, F.C.H.

General Manager, Eastern Bengal Railway; President, Indian Railway Conference Association

New Reichsbahn Divisional Managers

The following appointments of managers to divisions of the Reichsbahn in German Austria have been announced:—

Dipl.-Ing. Otto Schiessel, to be Divisional Manager, Linz.

Ing. Rudolf Töpfer, to be Divisional Manager, Vienna.

Dr. Karl Guggenberger, to be Divisional Manager, Villach.

Zinaida Troitskaya, initiator of the movement among women to master railway technique, has been appointed by the Commissar of Railways, L. M. Kaganovich, to be Chief of the Moscow Circular Railway. She is the first woman railway chief not only in the Soviet Union but in the world. Zinaida Troitskaya comes from a family of railway workers. She entered railway service in 1930, and in due course became an engine driver. In 1937 Troitskaya was appointed assistant chief of the Moscow Sorting Depot of the Lenin Railway, and at the beginning of this year was promoted to chief of the Locomotive Department.

Colonial Office Appointments

The Secretary of State for the Colonies has recently made the following appointments:—

Mr. J. T. A. P. Addington, to be Assistant Traffic Superintendent, Kenya & Uganda Railways.

Mr. G. P. G. Mackay, to be Assistant Traffic Superintendent, Kenya & Uganda Railways.

Mr. H. R. G. T. Chapman, M.C. (Accountant), to be Senior Accountant, Nigerian Railway.

Mr. G. S. Dick (Section Engineer, Nigerian Railway), to be Chief Engineer, Sierra Leone Railways.

Mr. F. R. Shields (Accountant), to be Senior Accountant, Nigerian Railway.

Mr. J. C. Swallow (Accountant), to be Senior Accountant, Nigerian Railway.

Mr. A. C. Sykes (Assistant Traffic Superintendent, Gold Coast Railway), to be Assistant Transportation Manager, Federated Malay States Railways.

We regret to note the recent death in Melbourne, at the great age of 91,

Mr. F. P. Watts

Assistant Southern Divisional Superintendent, Southern Railway, 1930–1938

Mr. F. G. Wainwright

Divisional Superintendent, Cardiff, G.W.R., 1921–38

Mr. F. Munns

Appointed Locomotive Works Manager, Eastleigh, Southern Railway

of Mr. Thomas Hale Woodroffe, who resigned from the position of Chief Mechanical Engineer, Victorian Government Railways in 1913. He joined the railways as an apprentice in Williamstown Shops in 1861 and worked his way up to the top of the department.

Mr. F. P. Watts, who, as recorded in our issue of December 16, retires on December 31 from the position of Assistant Southern Divisional Superintendent, Southern Railway, entered London & South Western Railway service as a junior clerk in 1891. He performed duty at various stations and was appointed a Relief Clerk in the Metropolitan Division, and afterwards a Relief Agent in the Main-Line Division. In 1907, Mr. Watts took charge at Surbiton, and in 1923, upon the formation of the Commercial Department, he was appointed Assistant Divisional Commercial Manager in the Central Division. In 1930 Mr. Watts was appointed Assistant Southern Divisional Superintendent at Southampton. Mr. Watts is succeeded by Mr. G. Bishop (see preceding page).

Mr. F. G. Wainwright, who, as announced in our issue of December 2, is retiring from the position of Divisional Superintendent, Cardiff, Great Western Railway, joined the company's services at Ross in 1888, and occupied various positions in that district until 1899, when he was appointed relief clerk at Cardiff. In 1906 he was transferred to the Office of the Superintendent of the Line and was engaged chiefly on outdoor duties in connection with the working of freight trains. He was promoted in 1909 to the position of Chief Clerk to the Divisional Superintendent at Gloucester, and the next year was removed to Cardiff in a similar capacity. In 1914 he was made Assistant to the Divisional Superintendent at Cardiff. Mr. Wainwright was appointed Divisional Superintendent at Cardiff in 1921. In 1924 the Great Western Railway, with the purpose of giving effect to the grouping of the lines in South Wales, reconstructed the Cardiff Division. It lost to the newly-formed Newport Division the Monmouthshire Valleys but took over the old Barry, Rhymney, and Taff Vale Railways, and some idea of the considerable proposition which faced Mr. Wainwright almost at the outset of his superintendency at Cardiff will be understood when it is known that these local railways carried over their network of lines an enormous mineral traffic, consisting of the coal exported from Cardiff and Barry Docks (the ports served by the Cardiff Division) a traffic which in the year 1924 amounted to 19½ million tons. The bringing under one control of three formerly competitive railways, and of the docks involved much reorganisation work in the division, for which Mr. Wainwright was responsible, and the extent of which may be gauged from the editorial note on page 1075.

Centenary dinner of Messrs. Rendel, Palmer & Tritton at the Dorchester Hotel on December 19

Photo] (*See pages* 1075, 1096, *and* 1100) [Swaine

Mr. F. Munns, whose appointment as Locomotive Works Manager, Eastleigh, Southern Railway, was recorded in our issue of November 25, was educated in Yorkshire, and took a three-year full engineering course at the Halifax Engineering College. Later he spent four years as a pupil of the late Sir Henry Fowler at the Midland Railway locomotive works, Derby, where for three years in succession he won the Directors Prize. His training completed, Mr. Munns joined a Manchester firm of consulting engineers as chief draughtsman, leaving a year later to join Rolls Royce Limited, at Derby. In 1914 Mr. Munns was appointed Machine, Fitting, and Frame Shop Foreman at Ashford works, S.E. & C.R. After grouping, in 1924, Mr. Munns went to Eastleigh, Southern Railway, as Assistant Carriage & Wagon Works Manager; and in 1929 became Assistant Locomotive, Carriage & Wagon Works Manager. His present appointment as Locomotive Works Manager has been effective from September 1 this year.

We regret to record the death at Warrington, on December 2, of Mr. Stenhouse George Boag, at the advanced age of 97. During his career as a civil engineer, Mr. Boag was engaged on several of the early railway undertakings, as well as, later, on the construction of the Manchester Ship Canal.

THOMAS COOK & SON APPOINTMENTS

Mr. Stanley Adams has been elected Chairman of Thos. Cook & Son Ltd., and Thos. Cook & Son (Bankers), Ltd., in succession to the late Sir Edmund Wyldbore Smith. Mr. Herbert E. Griffin has been elected Deputy Chairman of Thos. Cook & Son (Bankers), Ltd. Mr. E. Huskisson has been appointed Joint Managing Director of Thos. Cook & Son Ltd.

Mr. Stanley Adams is a Director of the Midland Bank Limited, the Guardian Assurance Co. Ltd., the Birmingham Small Arms Company, and other companies.

Mr. Herbert E. Griffin is also a Director of British Holiday Estates Limited, a new company formed under the *ægis* of Thos. Cook & Son Ltd. and the L.M.S. Railway Company for the purpose of developing a holiday centre in North Wales.

We regret to record the death on December 12, at the age of 77, of Mr. Robert Elliott. Mr. Elliott retired in 1926 from the position of head of the Timetable Department, L.N.E.R. (N.E. Area). His whole service was with the former North Eastern Railway and the L.N.E.R., and at the time of grouping he was Head of the Passenger Trains Section at York of the N.E.R. He was then appointed Chairman of the All Line Committee charged with the preparation of the L.N.E.R. timetable. Mr. Elliott was regarded as one of the leading experts in the country on timetable construction.

Mr. Tom Jefferson, Chief Mechanical Engineer, Central Railway of Peru, is in this country on a short visit.

FUNERAL OF MR. J. H. FOLLOWS

The funeral of Mr. John Henry Follows, former Vice-President of the London Midland & Scottish Railway, whose death was recorded in last week's issue, took place on December 16, at St. Peter's Church, Littleover, Derby. There was a large attendance of retired and present members of the L.M.S.R. staff and others associated with the social work of Mr. Follows. Members of the Derby Railway Veterans' Association lined the pathway as the cortège proceeded through the churchyard. Amongst the large assembly attending the funeral service, in addition to family mourners, were :—

Lord Stamp, G.C.B., G.B.E., Chairman and President, London Midland & Scottish Railway, and Lady Stamp; the Mayor of Derby (Councillor D. S. Butler); the Bishop of Derby (Dr. E. A. J. Rawlinson); Messrs. G. S. Bellamy; W. H. C. Clay; E. H. d'E. Darby; H. Fowler; V. Gee; R. Killin; J. M. Kirkwood; J. A. Kay; H. F. Loney; H. V. Mosley; J. Murray; H. Quirey; H. Rudgard; F. Ruffell; H. G. Smith; S. J. Symes; R. K. N. Speir; E. Taylor; J. Thompson; E. E. A. Talbot; J. W. Watkins.

The service was conducted by the Rev. C. R. Brown, Vicar of Littleover, and the Rev. F. L. Sargent, Vicar of Hazelwood. An address was given by the Very Rev. Herbert Ham.

Railway and other Reports

Foreign Railways Investment Trust Limited.—Revenue for the year ended October 31, 1938, amounted to £11,522 which, added to £43,990 brought forward from the previous account, makes £55,512. After providing for all expenses there remains a balance of £44,681 which is to be carried forward.

Southern San Paulo Railway Co. Ltd.—The directors announce that they are unable to make any payment of interest on January 2 on the 5 per cent. debenture stock owing to restrictions imposed by the Brazilian Government on the remittance to London of the company's funds in Brazil. Since the commencement of the moratorium in 1937, three payments of 1½ per cent. have been made.

State of Bahia South Western Railway Co. Ltd.—Gross receipts for the year to April 30, 1938, amounted to £40,694, an increase of £5,820, and working expenses advanced by £1,586 to £29,312, leaving net receipts of £11,382, which were £4,234 higher. Total tonnage carried was 75,852 tons, an increase of 14,117 tons, and the total number of passengers carried, 272,940, was a record. Although net earnings were sufficient to pay the full 8 per cent. on the prior lien debenture stock outstanding, the stockholders' committee considered it advisable, in consequence of the impossibility of obtaining remittances, to limit the payment on account of interest to 6 per cent. The scheme of arrangement of November, 1935, expired on October 31 last, and the holders of the 8 per cent. prior lien stock have agreed to its extension.

Midland Railway Co. of Western Australia Ltd.—The directors recommend a dividend of 2½ per cent., less tax, on the £593,162 of unified ordinary stock for the year ended June 30, 1938. This is the first payment made on this class of stock since 1929-30, when 3 per cent. was distributed. The sum of £35,000 is again being transferred to depreciation and renewals account, £3,000 is added to taxation reserve, and £2,966, less tax, is appropriated to reversionary certificates redemption account, leaving £29,491 to be carried forward, as against £30,267 brought in.

Greenwood & Batley Limited.—An interim dividend of 3 per cent. is announced, payable on December 29, the same rate as a year ago.

Central Wagon Co. Ltd.—Net profits for the year ended September 30, 1938, amounted to £72,323, compared with £71,671 for the previous year, after providing £22,000, against £21,000 for taxation. A sum of £35,000 is again appropriated to reserve, and a final dividend of 5 per cent., together with a bonus of 2 per cent., is being paid, making 10 per cent. for the year, the same as for 1936-37, leaving £8,114 to be carried forward, as against £7,041 brought in.

Birmid Industries Limited.—A profit of £78,419 for the year ended October 31, 1938, against £71,601 for 1936-37, is shown by this company, which controls a group of undertakings engaged in the manufacture of castings, &c., for use in the aeroplane, motor, and general engineering trades. The dividend of 10 per cent. and the bonus of 2½ paid for the year are at the same rate as for 1936-37, but on a larger capital, and absorb £62,078, against £54,844. The amount carried forward is £30,235, against £14,430 brought in. Combined outputs of the component companies were fully maintained during the year.

Moss Gear Co. Ltd.—Trading profits for the year ended August 31, 1938, were £132,843, against £120,911 for the previous year, and net profits rose from £60,478 to £64,475. Out of this net figure, £15,000, against £7,000, has been provided for taxation and N.D.C., and £2,000, as before, has been placed to preference dividend reserve, in accordance with the articles of association. The final dividend on the ordinary shares is 8¾ per cent., making 12½ per cent. for the year, the same as for 1936-37. A further sum of £4,000 is again added to preference dividend reserve, and a bonus of £2,500 is paid to the executive directors, leaving £20,427 to be carried forward, as against £33,451 brought in.

Rendel, Palmer & Tritton Centenary Dinner

(*See illustrations on pages* 1096 *and* 1098, *and editorial note on page* 1075)

Messrs. Rendel, Palmer & Tritton, consulting engineers, celebrated the centenary of their firm with a dinner at the Dorchester Hotel, London, on December 19. Mr. E. J. Buckton, Senior Partner, presided. There was a gathering of about 500, including the partners in the firm and their employees; representatives of technical institutions; home and overseas railways; the Ministry of Transport; and the Crown Agents for the Colonies; and many others associated with the engineering profession in all its branches.

Mr. Julian S. Tritton, proposing "The Guests," remarked that the gathering included representatives of large and important bodies who, like themselves, were proud of their centenarian whiskers. After a humorous transition from ancient to modern, he mentioned the ladies and made special reference to Lady Palmer, who, when she travelled by sea must feel proud of their late chief's achievements every time her ship entered the great harbours that were monuments to his memory. They were also proud to welcome guests from some of the farthest parts of the Empire—India, Australia, Burma, and representatives of the Crown Colonies. As one who had the privilege of serving on the railways of India, he had a personal reason for welcoming their railway guests, including those with whom they had collaborated on the Railway Board of India. All associated with the board's standardisation programme knew the difficulty of the tasks with which it had to deal, and wished it success.

He welcomed, too, the home railways, which so readily gave assistance in the discussion of mutual problems. Problems were gateways on the road of progress, and mentioning roads recalled to him that there were present representatives from the Ministry of Transport—the live Government department whose activities affected all of us. They also welcomed their friends from the Port of London Authority, and other ports and harbours with which they had been so closely associated since their earliest days.

Referring to the firm's inspecting staff, Mr. Tritton said he regarded its members as one of the greatest agencies for promoting understanding between this country and those in which they worked. It seemed to him that engineers were one of the strongest threads left in the confused pattern of international understanding. He also welcomed the technical press, saying he could not remember an occasion when it had not been ready to help them with reference and report; and lastly he extended a hearty welcome to the technical institutions, headed by the Institution of Civil Engineers, whose President, Mr. Binnie, had kindly allowed his name to be coupled with the toast. It was also an opportunity for expressing thanks to all who served in the offices of those institutions.

Mr. W. J. E. Binnie, replying to the toast, said it was the engineer's job to put into practical terms, or make useful for the community, what the scientist had discovered. In Ancient Rome the engineer was a person of great importance, and might even be preceded by lictors to clear the way for him as he proceeded to his office. He had traced contractors back to a very early period, and was not sure the Pyramids were not built by contract. Cicero said contracting was the best way of making money quickly (and honestly). There were very few contractors today who would acknowledge they ever made any money.

Lt.-Colonel E. Kitson-Clark also replied to the toast, and traced his own firm's association with Messrs. Rendel, Palmer & Tritton back for many years, when his grandfather had done a great deal of work for Sir Alexander Rendel. During the many happy years he himself was an intimate friend of Seymour Tritton, there had never been any question between them that could not be solved at once in a systematic and sensible way. He always thought Kipling was much to be thanked for giving engineers a very great idea of the dignity and importance of their work. There was a nobility in their profession that made them missionaries to the world, and with that nobility the firm of Rendel, Palmer & Tritton had a very great deal to do.

Mr. Loughnan StL. Pendred, C.B.E., proposed "The Firm," saying it went back to the very beginnings of engineering, and of the civilised world as we knew it today. Rendel was 38 when he founded the firm, and ever since he was 22 he had been doing important civil engineering work. Later the firm had been joined by Fred Palmer and Seymour Tritton, and there must be hundreds of engineers present who knew and loved those two. Looking back now on Seymour Tritton's insistence on the best workmanship, they felt he was laying the foundation of the reputation for the best work which this country enjoyed, and which firms like the present in its hundred years of existence had done so much to promote. He referred to the great amount of work the firm had done in the East, and, reviewing current enterprise of the firm, mentioned the Howrah bridge, and the reconstruction of Waterloo bridge.

Colonel C. Schmidt (Managing Director of Messrs. Vatten-byggnads-byran, consulting engineers, Stockholm), then presented Mr. E. J. Buckton with an illuminated address from his firm. He was sure the fine spirit of Messrs. Rendel, Palmer & Tritton would carry them through another century.

Mr. E. J. Buckton replied to the toast. After referring to various links with the history of the firm represented among those present, and to the different branches of engineering in which its members had distinguished themselves, he spoke of the engineering profession in relation to present circumstances. Mr. Buckton urged that large engineering structures should be put in hand in slump periods so as to be ready for the next boom. Discussing the future, he said he considered Communism, Fascism, and Nazism had done a great work, for they had made democracy healthier than ever. He suggested capitalism was the problem of the future for democracy. Money and labour were both necessary to produce profits, and both should where possible share in the profits. He believed that democracy would be healthier with an extension of the profit-sharing system for labour. This was a matter in which the firm of Rendel, Palmer & Tritton was trying to be really helpful in a material way.

A short entertainment concluded the evening.

STYLE AND CONSTITUTION OF THE FIRM

1838 *James Meadows Rendel*
1838 James Meadows Rendel, F.R.S.
1838 Nathanael Beardmore
1848 James Meadows Rendel, F.R.S. (Pres. Inst.C.E., 1851–53)
1856 *Alexander Meadows Rendel*
1894 *Sir Alexander M. Rendel & Son*
Sir Alexander M. Rendel, K.C.I.E.
William S. Rendel
1898 *Sir A. M. Rendel & Company*
Sir Alexander M. Rendel, K.C.I.E.
Frederick Ewart Robertson, C.I.E.
Henry Wedgwood Rendel
1903 *Rendel & Robertson*
Sir Alexander M. Rendel, K.C.I.E.
Frederick E. Robertson, C.I.E.
1912 *Rendel & Tritton*
Sir Alexander M. Rendel, K.C.I.E.
Seymour Biscoe Tritton
1913 *Rendel, Palmer & Tritton*
1913 Sir Alexander M. Rendel, K.C.I.E.
1913 Frederick Palmer, C.I.E.
1913 Seymour B. Tritton
1919 Frederick Palmer, C.I.E. (Pres. Inst.C.E., 1926–7)
1919 Sir Seymour B. Tritton, K.B.E.
1919 Sir Robert R. Gales, Kt.
1929 Frederick Palmer, C.I.E.(K.C.M.G. 1930)
1929 Sir Seymour B. Tritton, K.B.E.
1929 Sir Robert R. Gales, Kt.
1929 Harry John Fereday
1929 Ernest James Buckton
1929 Julian Seymour Tritton
1934 Sir Seymour B. Tritton, K.B.E.
1934 Sir Robert R. Gales, Kt.
1934 Harry John Fereday
1934 Ernest James Buckton
1934 Julian Seymour Tritton
1937 Ernest James Buckton
1937 Ralph Strick
1937 Julian Seymour Tritton
Consultants: Asa Binns; R. L. Ray; J. M. B. Stuart, C.I.E.

S.R. Western Division Loco. Running Dinner

Revelry was the keynote of the fifteenth annual dinner given by the Western Division of the Southern Railway Locomotive Running Department, Waterloo, held on December 14 at the Holborn Restaurant and presided over by Mr. E. S. Moore, the Divisional Superintendent.

To the Western Division, extending from Waterloo as far west as Wadebridge and Plymouth, this annual dinner is the reunion of old friends from the outposts, and the attendance was up to the usual high figure, including many retired members of the staff and also the following officers and guests:—

Messrs. A. Cobb, Locomotive Running Superintendent; R. M. T. Richards, Assistant Traffic Manager; J. A. Kay, Editor, THE RAILWAY GAZETTE; C. Grasemann, Public Relations and Advertising Officer; J. L. Moore, Ministry of Transport, D. Sheppy, Eastern Divl. Loco. Supt.; O. Cromwell, Asst. to General Manager; E. F. Livesey, Asst. for Development of Traffic; J. E. Sharpe, London West Divl. Supt.; A. B. Macleod, Assistant Stores Supt.; G. Wynne Davies, Asst. to General Manager; A. J. Hollins, Personal Asst. to Loco. Running Supt.; Commander Graham, Chief Mechanical Engineer, Docks and Marine; T. E. Chrimes, Asst. Eastern Divl. Loco. Supt.; W. T. Powell, Asst. Western Divl. Loco. Supt.; A. P. Shervington, Stephenson Clarke & Associated Cos. Ltd.; T. Ashton, Frederick Hotels Limited; T. Wallis, W. H. Smith & Sons Ltd.; V. G. Davies, Robt. Ingham Clark & Co. Ltd.; S. W. Smart, Asst. for Tram Services; C. L. Simpson, Asst. to Loco. Supt., G.W.R.; A. W. H. Christison, Divl. Loco. Supt., G.W.R.; E. A. Richards, Welfare Asst. to General Manager; M. Hatchell, Asst. Works Manager, Eastleigh; W. Marsh, Asst. to Chief Mechanical Engineer; C. S. Cobley, Asst. Divl. Supt., London West; F. Bishop, Asst. Divl. Supt., London Central; F. S. Whalley, Vulcan Foundry Limited; W. Walter, Asst. to Divl. Supt., Western; J. E. Bell, Asst. for Isle of Wight.

An orchestra gave musical selections during the dinner, and a concert party provided an entertainment afterwards. After the loyal toast, Mr. A. Moore of Nine Elms proposed "The Directors and Officers of the Southern Railway." Mr. A. Cobb, Locomotive Running Superintendent, responding, expressed his warm appreciation to Mr. E. S. Moore, together with his Assistant, Mr. W. Powell, and every member of the division, both at headquarters and the depots, for the high standard of efficiency in the Western Division which had been so apparent during the past year. Special reference was made by Mr. Cobb to punctual train running, particularly during the month of September, when the high average of "right time" trains constituted a record. Appreciation was expressed of the smart appearance of the engines running on the Western Division, an outward and visible sign of efficiency, and of very good publicity value.

A reference to the programme then showed "An Interlude by the Chairman," who, discarding the conventional chairman's hammer, announced himself by means of a massive station handbell. Mr. Moore expressed appreciation to Mr. Cobb for the very flattering tribute he had paid to his division, and feared a bad effect would result in the form of a swelled head. Mr. C. Grasemann, Public Relations and Advertising Officer, evidently having expected such a calamity, at this point interrupted the proceedings to place on the Chairman's head an outsize headgear of the Mad Hatter pattern, the brim resting nicely on the Chairman's shoulders. The crown, fitted with a door of approved firehole pattern, was opened by Mr. Cobb to enable the Chairman to continue his speech, talking through his hat.

Then followed a bewildering sequence of "leg pulls" and "stunts" on various members of the company, who, in some cases retaliated by putting one over on the Chairman. A decrepit professor, in cap and gown, appeared from apparently nowhere, reciting a poem that referred to square deals, square meals, and taking the biscuit, and then presented the Chairman with a Spratts biscuit measuring about 18 in. square. This introduction to the catering problem led to the presentation of a chef's hat and a bone to Mr. Ashton, the Dining Car Superintendent, with suitable remarks regarding the latter item. Mr. Ashton's response was a pair of kippers, which proved to be bloaters, one of which safely reached the Chairman.

Mr. Shervington was then given a becoming sun-bonnet and a skipping rope, as a cure for slimming. Mr. Shervington was apparently too overcome with gratitude to retaliate. The Chairman presented a mop and polishing paste to Messrs. Powell and Chrimes to facilitate the campaign they were carrying on in their respective divisions for clean engines.

One of the best retaliations came from Mr. Wynne Davies, who, on being given a trick drinking mug, borrowed the Chairman's handkerchief and from under this produced a glass of sherry which the Chairman drank with relish. The problem of misfit uniform clothing gave Mr. Macleod, and abetted by Mr. Hollins, the opportunity of handing to the Chairman a suit of blue dungarees suitable for a child aged four, with the assurance that they were guaranteed well shrunk.

Mr. R. M. T. Richards, in response to the toast of "The Visitors," gave his customary humorous speech and referred to the Chairman's popularity, the demand for his company at all other functions of this kind, and his consequent absence from home. In order that he should not be completely forgotten in his home circle, Mr. Richards then presented a life-size cartoon of Mr. Moore to be hung at home in memory of the absent one.

Mr. Keyzar proposed the toast of "The Chairman," remarking particularly on the good feeling that existed throughout the division due to leadership from headquarters.

Mr. Moore, in reply, thanked Mr. Cobb, together with all the divisional staff, for the support they had given him during the past year, also the Dinner Committee (Messrs. A. England, H. Cullingford and A. Dimmock) for the successful arrangements that evening. Mr. Moore also paid a personal tribute to the splendid ambulance work that had been carried on in the Western Division during 1938, resulting in the winning of four shields by teams from various depots.

The room was decorated with the Southern Railway green and yellow flags and above the Chairman two large posters were displayed, the one bearing the now familiar slogan, "The Railways Ask for a Square Deal *now*," the other insisting that "The Loco. want a Square Meal *tonight*."—W. T. P.

L.N.E.R. Carol Concert

The two hundred and fourth concert of the L.N.E.R. Musical Society took place in the Queen's Hall, London, on Saturday, December 17, when the full symphony orchestra of 100 performers, and the choir of 400 male voices drawn from every rank in the company's service, gave an impressive performance under the conductorship of Mr. Leslie Woodgate of the B.B.C. Before the concert, Mr. John L. Burrows gave an organ recital.

Under Mr. Woodgate's expert guidance the choir sang with complete unanimity and real response a number of carols, part-songs and cantatas. Among the last was the first performance of a new work by Mr. Woodgate, "The Sword of Olaf," an effective setting of Longfellow's ballad. The orchestra acquitted itself reasonably well both in accompaniment and in a number of solo items. Miss Gwen Catley a coloratura soprano, chose from her *repertoire* a number of songs involving vocal duels with herself, but emerged from the performance only slightly scratched.

The L.N.E.R. Musical Society receives the ready support and assistance of past and present directors and officials of the company. Among those present on this occasion were:—

Mr. William Whitelaw, late Chairman; Mr. W. B. Gair, Director; Sir Alexander Butterworth, late Director; Sir Ralph Wedgwood, Chief General Manager; Messrs. O. H. Corble, Assistant to Chief General Manager; P. J. Dowsett, Secretary; A. L. Gibson, Continental Manager; W. H. Johnson, Assistant Secretary; Dr. Grant McMahon, Medical Officer; Messrs. L. H. K. Neil, Assistant Continental Manager; C. H. Newton, Divisional General Manager; M. D. Robinson, Locomotive Running Superintendent; J. E. Sharpe, Assistant Superintendent; Percy Syder, City Manager.

Considering the choir had been assembled from such places as Cambridge, Doncaster, Grimsby, Ipswich, Lincoln, London, Norwich, Peterborough, and York, the excellence of articulation and discipline in the matter of expression testified to the soundness of their local training.

Agreed Rates in India: B.B. & C.I.R. Experiment

By J. E. C.

To the earnest student of transport, there is something tragic in the policy of *laissez-faire*, which has been accepted in the development of road transport even in the countries where State ownership of railways prevails. This policy has given the country a costly and duplicate system of transport, which must, ultimately, be a burden on trade and industry, either directly by forcing up charges on non-competitive traffic or indirectly by being a drain on national taxation. If it be accepted that railways will remain the iron backbone of inland transport, the desirability of achieving co-ordination between the various rival forms is indisputable, but until such time as Government ordains it, the railways have to adopt tactics to conserve their revenues.

A close study of the traffic generally catered for by motor lorries discloses the disturbing fact that competition is severest for the carriage of high-rated commodities, a feature which is in such marked contrast with the developments in motorbus traffic: the main bulk of diversion from rail is in respect of lower class passengers to whom economy is a consideration more important than comfort. Almost perversely, the competition, which railways are called upon to face from coastwise country craft, affects traffic in the lower ranges of classification: cheap and bulky goods, mostly unmanufactured, and articles of small intrinsic value are quite easily and safely conveyed by this ancient but vigorous form of transport.

The principle of classification, whereby commodities are ranged in various categories according to their intrinsic value, their measure of place-utility and their ability to bear freight charges, has served to foster the growth and development of trade and industry for over a century; but unhappily for the railways, neither the road haulier, nor the country craft operator, subscribes to this differential mode of rating; so that at both ends of the classification, there is terrific competition. It is really difficult to say which is the more potent competitor, but it is certain that corrosion into railways' revenues is financially serious. In past years, when traffic was almost embarrassingly prolific, no serious attempt to counter country craft competition was made; but in recent times the Bombay Baroda & Central India Railway has been perturbed by the increasing diversion to the coastal *patmar*, which, ranging in size from 25 to 75 tons, caters for the traffic between Bombay and the small towns all along the West coast, specially during the fair weather months. As is well known, water provides the easiest and cheapest surface for transport; and if it is remembered that the fisher folk who operate these country craft live in almost primitive conditions, it will be appreciated that the problem of eradicating this form of transport is not easy of solution.

However, the B.B. & C.I.R. has recently introduced the flat-wagon rate principle for the inward traffic of the Gaekwar Mills Limited at Billimora, and the Cotton & Silk Mills at Navsari. For a load of 200 maunds (approximately 8 tons) consisting of all kinds of mill stores—bobbins, bleaching powder, caustic soda, china clay, cotton, farina, hessian cloth, jute twine, leather belting, lubricating oil, machinery, millboard, starch, &c.—all consigned in one wagon, a charge of Rs. 50s. (£3 15s.) is being made: the usual charge for a wagon load of 200 maunds is Rs. 113s. (£8 10s.).

This is an interesting development, akin to the system of "agreed charges," but operating in the reverse direction: not the products of a firm, but its requirements, are charged a flat wagon rate.

Doubling the Gotthard Route

Single-line sections at present impede this important international line in meeting increased competition from the Brenner route

In connection with a general Government programme of public works which is at present under discussion, local interests in many cantons are pressing the claims to urgency of double-tracking particular routes of the Federal Railways. The Romont-Fribourg section of the main line between Geneva, Lausanne, and Berne is a notable case, and the Moutier-Choindez single line between Bienne (Biel) and Delémont is also a considerable handicap to traffic working. The route which is certain to receive first consideration, however, is the Gotthard and its approaches, and the sections most urgently requiring to be doubled are Brunnen—Fluelen, and Taverne—Lugano. Competition of the Brenner route is more severely felt than ever owing to the political changes of the last year or two, and it is imperative that the Gotthard line should be doubled throughout; the gaps from Riviera to Taverne, and from Melide to Maroggia would, however, remain single for the time being.

The cantons of Basle, Aarau, Zug, Schwyz, Uri, and Tessin have petitioned that the Rupperswil—Immensee line, which at present is double from Lenzburg to Wohlen only, should be doubled throughout. This is an important approach line to the Gotthard, and is used by all through goods traffic from the Basle direction (*via* the Olten avoiding line), as well as by certain international passenger trains making no scheduled stop in Switzerland, such as the Riviera Express, the Dutch boat trains to Genoa, and the *Kraft durch Freude* and *Dopolavoro* specials. There is, however, some opposition in Lucerne, where it is contended that the main route for passenger trains is and should remain the Olten—Lucerne line and its continuation to Immensee, where it joins the freight route.

It has already been reported in THE RAILWAY GAZETTE that the Lucerne—Emmenbrücke section is being doubled between Sentimatt junction, and Emmenbrücke, but the entry to Lucerne will still be made over two parallel single lines from Sentimatt, one for the Basle, Berne, and Seetal routes, the other for the Zurich, and Gotthard lines. The claim is therefore made that the approach lines to Lucerne, over which there is a considerable traffic during the season, should be improved before any further work on the freight route *via* Wohlen is taken in hand. Doubling of the Lucerne—Immensee section is also requested, but this is hardly likely to receive consideration for many years to come, particularly as a new crossing-loop was provided at Würzenbach, between Lucerne and Meggen, in 1936, appreciably facilitating the working of this line.

Exports of Railway Material from the United Kingdom in November

	Nov., 1938	Nov., 1937	Eleven Months Ending Nov., 1938	Nov., 1937
	£	£	£	£
Locomotives, rail	128,316	35,984	1,457,668	901,949
Carriages and wagons	174,467	125,863	2,819,894	2,576,224
Rails, steel	126,488	136,559	1,096,526	1,289,274
Wheels, sleepers, fishplates and miscellaneous materials	165,870	174,626	1,968,552	1,560,486

Locomotive and rail exports included the following:—

	Locomotives		Rails	
	Nov., 1938	Nov., 1937	Nov., 1938	Nov., 1937
	£	£	£	£
Argentina	9,883	6,634	8,187	6,157
Union of South Africa	—*	—*	34,817	16,488
British India	33,929	17,400	8,873	10,855

* Figures not available

Indian Railway Conference Association, 1938 Session

Subjects emphasised included advertising by and on railways, incivility and corruption, obligations to the public, safety, and road transport

The autumn session of the Indian Railway Conference Association opened at Delhi on November 26, with Mr. A. F. Harvey, General Manager, Eastern Bengal Railway, as President. After welcoming the Member for Communications, the Chief Commissioner, and other members of the Railway Board, and the delegates, Mr. Harvey stated in his presidential speech that the net result of the activities of his predecessors, the organisation officers of the various railways, and the Wedgwood Committee, had been to leave him without much choice of subjects.

Presidential Address

Mr. Harvey placed considerable emphasis on the question of advertising both by the railways and on the railways. He felt that the railways had not been spending on advertising as much money as they ought to have spent. An analysis of the advertising expenditure would show that a large proportion of the amount spent went towards advertisements relating to staff recruitment, calls for tenders, alterations in train services and timetables, and other such non-productive expenditure. The net expenditure for securing additional passenger and goods traffic was thus considerably reduced. Proposals to increase the advertising budget were often viewed with alarm. A comparison of such increase with the gross earnings of the railways, and a reckoning of the amount by which the gross earnings should be increased in order to recoup the additional expenditure, would enable the proposals to be seen in a truer perspective. On the Eastern Bengal Railway, an additional advertising expenditure of Rs. 20,000 could be made good by an increase of 0·1 per cent. in passenger earnings or 0·05 per cent. in goods earnings.

Dealing next with the question of advertising on railways, the President mentioned the decision of the Eastern Bengal Railway to use for advertisements the sides of broad-gauge wagons not in the wagon pool, and certain classes of coaching stock, such as luggage and parcels vans. The experiment would, except on rare occasions, be confined to stock which would run only on the E.B.R. This form of advertisement was popular in New Zealand and full information and photographs had been obtained from the New Zealand Railways of what they had done in this direction. Mr. Harvey stated that the experiment was intended to find out whether the scheme would be supported by commercial and trading concerns, what it would cost to reproduce the advertisements on the sides of the vehicles, both steel and timber, whether it was practicable to maintain the advertisements in reasonably good condition at a reasonable cost during the period between thorough overhaul of the vehicles, and what advertisers were prepared to pay for such advertisements.

Referring to incivility and corruption—factors which had earned for the railways a bad reputation with the public—Mr. Harvey said that the Railway Board intended to amend the rules relating to discipline so as to bring incivility to the public within the category of offences, the maximum penalty for which was removal from service. Railway employees might be inclined to argue that the evil of corruption among railway staff was not as great as the public tried to make out. But this view was negatived by the fact that railway employees themselves often complained that those who dealt with matters connected with leave applications, promotions, and similar matters expected, if they did not actually demand, illegal gratification.

Mr. Harvey pointed out that the difficulty of the administrations in the way of putting an end to these objectionable practices was the apathy of the public, which very seldom came forward with specific cases. One of the probable reasons for this attitude was the fear that helping the authorities with evidence against the staff might result in harassment in regard to wagon supply and similar business disabilities.

The President suggested propaganda among the staff for the removal of incivility and corruption. An attempt might be made to convince the employees that their well-being and prosperity depended upon the well-being and prosperity of the railways, and that the latter goal could not be achieved so long as the public did not receive decent treatment, especially in these days of growing road competition. He thought that the aid of recognised local railway labour unions might be enlisted for such propaganda, and was particularly anxious to know whether any other railway had taken action on similar lines, and, if so, with what results. He suggested that the subject might be included in the list of those to be discussed informally during the session.

Railway Member's Speech

Sir Thomas Stewart, Member for Railways and Communications, Government of India, addressing the conference, referred to the obligations of service towards the great public of India. The more voluble critics might say that the railways were not meeting these obligations. The Hon. Member doubted whether they viewed the problem in a proper light. The humanitarian who, today, criticised the treatment of the travelling public, was apt, tomorrow, to turn into a financial expert who condemned extravagance. Too little was it realised that the provision of amenities was not merely a matter of humanitarian sentiment, but was governed by financial considerations and circumscribed by financial necessity. However, there was no room for complacency, even if the criticism might be true in part only. To the extent to which the criticisms were justified, the railways must make honest and reasonable endeavour to remove the grounds of complaint, and must also be in a position to refute unjustified criticism.

Safety of Railway Travel

In the course of his speech Sir Thomas Stewart referred to the question of safety of railway travel, a question which recent accidents have brought into prominence. Sir Thomas said that the Indian railways had no mean record in that respect, but one major accident could so easily destroy the confidence built up over a series of less eventful years. The Member for Communications did not propose to anticipate the findings of the Mount Committee, but whatever they might be, it would be the task of the railways in the future to re-create in the minds of both the travelling public and the railway staff the confidence which formerly existed. That might be no easy task, but, Sir Thomas emphasised, an early restoration of morale was of vital importance.

Road Competition

Turning to the question of road-rail competition, Sir Thomas said that the Motor Vehicles Bill for the adequate regulation of motor vehicles, which would remove the conditions of uneconomic competition, was not a measure designed to strangle motor transport in the interests of railways. On the contrary, the sane control which it envisaged was in the best interests of motor transport itself, and of the administrations which were concerned with the development and maintenance of road systems in the provinces.

Concluding Speeches

At the close of the session, the President expressed his thanks to all present for their assistance, including the members of the three sub-committees, the commercial and operating committees, and the various sections for their able and valuable reports. After referring to the value of the recently introduced informal discussions at Conference sessions, he concluded by paying warm tribute to Mr. Lawrence, the Conference Secretary, and his staff. Mr. J. A. Bell, General Manager, E.I.R., in an eloquent speech, proposed a vote of thanks to the President, which was seconded by Mr. J. Fearfield, Manager, Bikaner State Railway.

QUESTIONS IN PARLIAMENT

Main-Line Railway Receipts

Mr. Wm. Adamson (Stafford, Cannock—Lab.), on December 7, asked the Minister of Transport if he would give the aggregate net railway receipts of the four main-line companies for each of the last 15 years.

Dr. Burgin, in reply, circulated the following figures :—

Railway net receipts of the four main-line railway companies

Year	£
1923	38,700,000 (*a*)
1924	35,300,000 (*a*)
1925	33,400,000 (*a*)
1926	17,200,000 (*a*)
1927	38,100,000
1928	36,800,000
1929	40,300,000
1930	33,700,000
1931	31,500,000 (*b*)
1932	26,100,000 (*b*)
1933	28,000,000 (*b*)
1934	30,300,000 (*b*)
1935	30,700,000 (*b*)
1936	32,700,000
1937	34,400,000

(*a*) Adjusted to allow for subsequent changes in accounting practice.
(*b*) Adjusted in respect of the revised basis of local rates.

Pool Receipts

Sir Joseph Nall (Hulme—U.), on December 7, asked the Minister of Transport what was the number of Green Line buses entering and leaving the London central area daily ; what were the comparable figures in 1935 and 1933 ; and whether the revenue of the Green Line services was included in the pool between the London Passenger Transport Board and the main-line railway companies.

Dr. Leslie Burgin : The numbers of Green Line coaches entering and leaving the London Central Area on a normal week-day in December in 1938, 1935, and 1933 were 569, 572, and 608 respectively. The receipts from Green Line coaches are included in the pool between the London Passenger Transport Board and the main-line railway companies.

Withdrawal of L.N.E.R. Trains

Mr. H. W. Butcher (Holland with Boston—L.N.), on December 7, asked the Minister of Transport whether, in view of the decision of the L.N.E.R. to withdraw at an early date over 100 trains from its schedule of services, he proposed to consult with road transport organisations to ensure that adequate travelling facilities were provided for the public.

Dr. Leslie Burgin : The traffic commissioners will no doubt take into consideration, when considering applications for road service licences, any representations which may be made to them that the public are not obtaining adequate transport facilities because of the withdrawal of certain trains to which my hon. friend refers.

Road and Rail Accidents

Mr. James Hall (Stepney, Whitechapel—Lab.), on December 7, asked the Minister of Transport if he would give the number of persons killed and injured in road accidents attributed to the drivers of commercial road vehicles, and to defects in such vehicles, in 1937 ; and the number killed and injured in accidents on the railways during the same year.

Dr. Leslie Burgin : Information regarding accidents on the roads and the railways, respectively, will be found in the following publications : " Road Accidents involving Personal Injury, 1937," and " Report upon Accidents which occurred on the Railways of Great Britain during the year 1937."

For an analysis of the causes of road accidents the hon. member should consult : " Report on Road Accidents in Great Britain for the year ended March 31, 1937." Copies of all these documents are in the library.

Air Raid Precautions

Mr. B. V. Kirby (Everton—Lab.), on December 8, asked the Lord Privy Seal what steps he was taking, in conjunction with the Liverpool City Council, the Mersey Docks and Harbour Board, railway companies, and employers' associations, to provide adequate protection during air raids of the large number of workers in Liverpool employed on the docks, in warehouses, and in the many large industrial concerns in the city, most of whom would be doing work of prime national importance during the period of such an emergency.

Sir John Anderson (Lord Privy Seal) : In general it is expected that employers will take steps for the protection of their workpeople but the special position of the essential public utilities is under discussion with the bodies concerned.

London & North Eastern Railway

Mr. Trevor Cox (Chester, Stalybridge and Hyde—C.), on December 12, asked the Minister of Transport if he would cause enquiries to be made at once in regard to urgent matters relating to the L.N.E.R. carriage and wagon works at Dukinfield.

Dr. Leslie Burgin : I am in communication with the London & North Eastern Railway Company and will let my hon. friend know the result in due course.

Railway Electrification

Mr. V. La T. McEntee (Walthamstow—W. Lab.), on December 12, asked the Minister of Transport whether, in view of the progress that had been made with the electrification of the East London railways where work was proceeding, he could now favourably consider the electrification of the Liverpool Street-Chingford line.

Dr. Burgin : This is a matter primarily for the consideration of the undertakings concerned. I am informed that until further progress has been made with the programme of railway improvements at present being carried out in the London Passenger Transport area, at a cost of some £40,000,000, it is not possible for the undertakers to envisage the scope of the next programme of works to be undertaken. Transport facilities in the London area are, however, being examined and the priority determined of works to be considered when the present programme is completed.

Stone Railway Station

Sir Joseph Lamb (Stone—C.), on December 12, asked the Minister of Transport if his attention had been called to the existing danger at the L.M.S.R. station at Stone, Staffordshire, where the only access from the booking office to the platforms for passengers travelling north or south was by way of open crossing with no protection from passing trains ; and if he would have enquiries made with a view to the provision of an adequate footbridge or other protection for the public.

Dr. Burgin : The London Midland & Scottish Railway Company informs me that it is giving further consideration to the question of providing a footbridge or other protection at Stone station. I will let my hon. friend know the result as soon as possible.

Puigcerda-Barcelona Railway

Sir Nairne Stewart Sandeman (Middleton and Prestwich—C.), on December 12, asked the Prime Minister whether he was aware that the nationalised railways electric power station of La Tour de Carol in France was making plans to supply Government Spain with its surplus output of 30,000 kW. to enable the Puigcerda–Barcelona railway line to function normally and the unrequired balance to be used for driving factories, &c. ; and whether, as this was a breach of the non-intervention agreement, he would make representations about this matter.

Mr. R. A. Butler (Under-Secretary of State for Foreign Affairs) : Yes, sir, but I am advised that assistance of this kind would not constitute a breach of the Non-Intervention Agreement. The answer to the last part of the question is therefore in the negative.

Railway Companies and Smoke Abatement

Mr. B. V. Kirby (Everton—Lab.), on December 13, asked the Minister of Health whether, in relation to replies he gave in the House to him on November 18, 1936, and June 21, 1937, he could now give the House any information as to the result of the conference in Liverpool on November 16, 1938 ; was he aware that the Liverpool University, the Royal Infirmary, and other users of large amounts of coal in Liverpool had taken steps to reduce the smoke nuisance, whereas the railway companies appeared to have taken none ; that a gauge in the thickly-populated Everton district had, over a period of many years, registered the highest soot deposit for the whole of the country ; and what steps he proposed to take to abate the nuisance to the inhabitants.

Mr. Walter Elliot (Minister of Health) : I am informed that as a result of the recent conference in Liverpool the

L.M.S.R. has decided to initiate a series of experiments in methods of firing locomotives with the object of mitigating smoke nuisance. I am informed that this gauge has been placed intentionally in the midst of one of the most densely populated parts of Liverpool. The Everton district is not an industrial area, and the gauge there is registering for the most part deposits resulting from the burning of domestic coal. The Liverpool Corporation has been active in mitigating the nuisance from manufacturing smoke.

Open Compartment Doors on Underground Lines

Mr. H. P. Mitchell (Brentford and Chiswick—C.) on December 14 asked the Minister of Transport, if he was aware that frequently on the underground lines the doors of compartments were left open between stations, thereby causing discomfort, and even danger, to passengers; and if he would consult with the London Passenger Transport Board with a view to introducing without delay, throughout its whole system, automatic-closing doors which had just been experimentally tested.

Dr. Leslie Burgin: I was not aware of this practice but I am in communication with the London Passenger Transport Board on the matter and will inform my hon. friend of the result as soon as possible.

Railway Facilities in Fife

Mr. W. Gallacher (Fife, W.—Comm.) on December 14 asked the Minister of Transport, whether he would cause enquiry to be made into the very unsatisfactory nature of railway transport facilities in the county of Fife, particularly the closing down of the station at Kelty; and whether he would consult with the railway company concerning the necessity of increasing the utility to the public of the services concerned.

Dr. Leslie Burgin (Minister of Transport): I am informed by the L.N.E.R. that the company considers the train services which it provides in the County of Fife to be adequate for the traffic which is offered. The only important instances where facilities have been withdrawn in recent years are the closing, for passenger traffic, of the Dunfermline—Kincardine and Kincardine—Alloa lines in 1930, and of the Leslie branch in 1932. The passenger train service, which was very little used, was withdrawn from Kelty station in 1930, as part of a scheme for effecting economies in the face of declining revenue. I am assured that in each case adequate alternative facilities exist to meet the requirements of the districts concerned.

Mr. Gallacher: Is there any possibility of coming to some understanding with the railway company, so that the company will increase the amount of the traffic and get these lines opened up, because as the Minister will be aware there is a very inadequate rail way service in Fife?

Dr. Burgin: At Kelty there were only 17 or 18 passengers a day for a number of years and the passenger bookings fell by nearly 97 per cent.

Mr. Gallacher: Was that not due to the fact that passengers were not encouraged because of the infrequency of the trains and the irregular service?

Dr. Burgin: There were five each way.

Air Bookings at Railway Agencies

Mr. W. R. D. Perkins (Stroud—C.) on December 14 asked the Secretary of State for Air, whether the railway companies had yet freed all the internal air lines, including the service between London and Dublin, from the booking ban.

Captain H. H. Balfour (Under Secretary of State for Air): Booking facilities at railway agencies are now available for all existing air services, including the service between London and Dublin.

Dukinfield Railway Coach Works

Mr. F. B. Simpson (Ashton-under-Lyme—Lab.), on December 15, asked the Minister of Labour if he was aware of the diversion of the L.N.E.R. coach-building works from Dukinfield; and, in view of the already depressed state of industry locally, he would consult with the company with a view to retaining or extending such employment for Dukinfield.

Mr. Ernest Brown (Minister of Labour): I would refer the hon. member to the reply given by my right hon. friend the Minister of Transport to the hon. member for Stalybridge and Hyde on December 12 of which I am sending him a copy.

Mr. Simpson: Will the Minister endeavour to secure some substitute work for these men in view of the railway work being diverted?

Mr. Brown: If the hon. member will look at the answer of which I am sending him a copy, he will see that my right hon. friend is in communication with the railway company.

Railway Rates

Mr. Creech Jones (Yorkshire, W. Riding, Shipley—Lab.), on December 15, asked the Minister of Transport whether, in their conversations with him, the representatives of the railway companies indicated that they wished to maintain the existing voluntary agreement between the railway companies and the coastwise liner companies on the subject of rate control and that they would support the extension of this agreement to the road-haulage and canal companies, as recommended in the Report of the Transport Advisory Council presented in July of this year.

Dr. Leslie Burgin (Minister of Transport): No, Sir. The matters mentioned in the question, which as the hon. member indicates, have already been the subject of recommendations by the Transport Advisory Council, will doubtless be taken into account by the council in its consideration of the railway companies' proposals.

Railway Rates Inquiry

Mr. R. De la Bere (Worcester, Evesham—U.), on December 19, asked the Minister of Transport, whether, in regard to the case of the railways, which was to be referred to the Transport Advisory Council, he would take steps to have the proceedings of this council held in public, since these matters affected all sections of the public.

Captain Austin Hudson (Parliamentary Secretary to the Ministry of Transport): The question is one for the council, and I understand that their decision is that the committee, which the council has appointed to deal with the matter, may, if it is hearing oral evidence and if it considers desirable, admit the public.

Forth and Clyde Canal Timber L.M.S.R. to meet Corporation of Glasgow

Mr. J. J. Davidson (Maryhill—Lab.), on December 20, asked the Secretary of State for Scotland what progress was being made to ensure greater safety for children at the Timber Basin, Forth & Clyde Canal, Glasgow.

Mr. D. J. Colville (Secretary of State for Scotland): I am informed that the Corporation of Glasgow has made further representations to the L.M.S.R. on this matter, and that arrangements have been made for representatives of the corporation and of the railway company to meet on Friday, December 23, to discuss the subject.

Proposed Absorption of the Private Railways of Sweden

The question of State absorption of the privately-owned lines continues to attract attention. Some of the latter are in a poor condition financially and would be a burden to State funds, but others are in a different position and their absorption would assist in filling up gaps in the State network of routes. The private lines have been considering the whole question very carefully, in view of the report [a summary of which was published in our overseas columns on page 1041 of our issue of December 16] of the commission appointed to inquire into it, and have proposed amalgamation among themselves and other measures to improve their position. It is intended to effect economies by closing certain lines, modernising the locomotives and brake equipment, introducing further railcar services and converting the gauge in some cases, to enable more convenient services to be run. The total abolition of private ownership is naturally resisted by the private railways' association, which advances the view that this could not achieve the economic ends desired. This view seems, in general, to find support among the public. The State, of course, now owns a considerable share in many of the private lines.

NOTES AND NEWS

Argentine North-Eastern Moratorium.—It is announced by the Argentine North Eastern Railway Co. Ltd. that the trustees for the holders of the 5 per cent. "B" debentures and debenture stock have extended the interest moratorium until December 31, 1939.

Brazilian Railway Collision.—A collision occurred on December 19 between a passenger train and a goods train near Juiz de Fora, 100 miles north of Rio de Janeiro, on the Central Railway. The number of deaths in the collision is now reported to be 59, and over 60 passengers were injured.

Civil and Mechanical Engineers' Visit to U.S.A.—The Institutions of Civil and Mechanical Engineers are arranging a joint meeting to be held in New York during the week beginning September 4, 1939. This is in response to an invitation received from the American Society of Civil Engineers to the Institution of Civil Engineers and from the American Society of Mechanical Engineers to the Institution of Mechanical Engineers.

Enginemen's Mutual Improvement Classes.—To date 139 classes are grouped in the steadily growing Federation of Enginemen's Mutual Improvement Class movement. The federation's official calendar will shortly be available at 1s. from the Hon. Secretary, Mr. A. E. Jennings, 131, Valence Avenue, Dagenham, Essex, from whom the official badges, rule charts, and round-the-wheel cards can also be obtained.

Roumania's New Rail Link with Ruthenia.—Direct communication between Central Roumania and Ruthenia has been re-established by the opening, on December 19, of a section of line between Northern Transylvania and Bucovina. Communication had been broken when Hungary acquired part of south-east Ruthenia, as the line passed for a few kilometres through the new Hungarian territory. There was an official ceremony at the opening of the line, which runs from the Bistritza valley to Dorna-Vatra.

L.N.E.R. Assessment.—In a circular to rating authorities the Railway Assessment Authority points out that in the draft of the part of the second roll relating to the London & North Eastern Railway, as settled by that authority, the average net receipts of the undertaking as a whole in England and Wales for the five years 1930-34, are entered at £8,238,739. The cumulo is entered at £1,100,000. Of this cumulo, there has been allocated to the principal undertaking the sum of £1,037,132, to the docks £61,585 in the aggregate, and to the canals £1,283.

Railway Rates Tribunal Sittings.—The tribunal will sit on Tuesdays, January 17, February 14, March 14, April 18, May 16, June 13, July 11, October 17, November 14, and December 12, 1939, to hear applications as to the granting of new, or the reduction of existing, exceptional rates. The Court will also sit on Tuesdays, January 24, April 25, July 18, and October 24, 1939, to hear applications relating to classification; applications as to reductions to be made from standard charges where damageable merchandise is carried under owner's risk conditions; and applications as to rebates under the Railway Freight Rebates Scheme.

River Navigation in North Manchuria.—The Manchukuo Government has taken over the property of the Harbin Navigation Society at a price of five million yen, according to a message received by the Osaka Shosen Kaisha, at Tokyo, from its Harbin office. The Government has decided to entrust the South Manchuria Railway Company with the management of the Society, the message adds, in view of the increasing importance of river navigation in North Manchuria.

Great Western of Brazil Moratorium.—The directors of the Great Western of Brazil Railway Co. Ltd. announce that the committee appointed under the scheme of arrangement approved in June last for the 4 per cent. debentures and 6 per cent. debenture stock have extended the moratorium period until December 31, 1939. Under the scheme the 6 per cent. debenture stock was charged on the undertaking equally with the 4 per cent. debentures, following on the ruling of the High Court in January last. The scheme also provided for an interest moratorium on both classes of debentures.

Opening of Charing Cross Model Railway Exhibition.—Mr. R. Holland Martin, Chairman of the Southern Railway and of the Railway Companies' Association, opened, on Wednesday last, the model railway exhibition which the four main-line railways in co-operation with London Transport have arranged at Charing Cross Underground station. This fascinating display consists of scale-built working models of trains representing the Cornish Riviera Limited, The Coronation Scot, the Coronation, and the Southern Belle expresses. They are operated from a single control panel and thread their ways among scenic dioramas representing types of coastal and inland scenery reached by British railways. Among those present were:—

Lord Ashfield, Sir Harold Hartley, and Major L. F. S. Dawes. Messrs. G. H. Loftus Allen, W. C. Brudenell, C. G. G. Dandridge, Major J. M. Dewar, Messrs. F. Goodricke, C. Grasemann, J. R. Hind, J. A. Kay, C. J. Selway, and E. Rawdon Smith.

Opposition to M'Lintock Report.—At a special meeting of the Civic Transport Committee of the Belfast Corporation, the report of the M'Lintock Committee was considered with regard to the suggested merging of the Civic Transport undertaking with any new transport board that might be set up. No report of the meeting was issued to the press, but it is expected that the attitude of the Municipal Transport Committee will be opposed to the M'Lintock recommendations, and it is also expected that the views of the committee will be ratified by the Corporation. The Belfast Municipal Transport undertaking is a profitable concern to the city. The Ulster Farmers' Union has also expressed itself as opposed to the recommendations of the M'Lintock Committee and urges the withdrawal of the Northern Ireland Road and Rail Transport Act in so far as freight services are concerned in rural areas.

Southampton Docks Developments.—The new building of General Motors Limited on the Docks Extension Estate, Southampton, has now begun commercial operations, which, in addition to storage of cars and parts shipped from Canada and the U.S.A., include the assembly of vehicles for sale in this country. Improvements are now being carried out by the Southern Railway at the old docks, where 1,600 ft. of quay fronting the River Itchen are being widened by 35 ft., and the depth of water increased in the berths concerned. Trade with New Zealand at Southampton has brought an increase in imports of 30 per cent. this year, and the docks are to be represented at the forthcoming New Zealand Centennial Exhibition.

Subsidence near Burngullow, G.W.R.—At about 7.45 a.m., on December 16, a subsidence occurred between the up and down main West of England lines about 1½ miles west of Burngullow station, Cornwall, resulting in a hole some 20 ft. deep and about 7 ft. in diameter appearing in the 6-ft. way, and necessitating the suspension of traffic. Until repairs had been effected, main-line trains were diverted *via* the Newquay branch, and a local service provided by bus between Truro and St. Austell. The hole was more directly under the up road, and by slewing the down line and strengthening it with rail glands, it was made fit for traffic at restricted speed by 1.20 p.m. The hole was completely filled and the up line strengthened and opened for traffic by 4.15 p.m. The sudden settlement was probably due to the existence of an old tin mine shaft, but further investigation is being made in regard to this.

London Transport Posters.—London Transport makes a practice of extracting interesting items from its annual reports for display as notices in trains and on stations. Some points are selected as the basis of full-size posters, and the current choice of this kind is a pictorial representation of where the passenger's money goes. Salaries and wages head the list in the shape of four half-crowns and a three-penny-bit. At the foot of the poster three shillings and two pennies show the claims of interest. Other groups of coins, spread out before the passenger's covetous eyes with a realism that cruelly defies the clutch of the itching palm, demonstrate the apportionment

of receipts to fuel, power, and supplies (2s. 3d.); rates and taxes (1s. 8d.); renewals (1s. 6d.); and other items (1s. 2d.). We have even seen this poster arrest the attention of two small boys, who forthwith fell to totalling up in loud and argumentative voices the separate amounts to make sure that they did, indeed, make one pound. Two other recent London Transport posters advise travellers to shop early for their own comfort, combining the slogan with a background that is effective by reason of its simplicity and apparent texture conveyed by the colouring.

L.M.S.R. Station Gardens Competition.—No fewer than 455 stations entered for the L.M.S.R. 1938 competition for the best-kept station gardens, an increase of over 50 compared with last year. Special prizes have been awarded to Black Horse Road (London), Knighton (Radnor), St. Asaph (Flint), Weston (Bath). First class prizes go to: Alcester (Warwick), Bletchley, Broxton (Cheshire), Buckingham, Llanfairfechan, Reddish, Thatto Heath (Lancs), and Walthamstow (London). Second class prizes have been given to: Alsager (Cheshire), Bath, Blencow, Blunham, Byfield, Caton, Chatburn, Harpenden, Hindley Green, Llandrindod Wells, Lytham, Morecambe, Mossley Hill, Narborough, Ockendon (Essex), and Sowerby Bridge.

Road Accidents.—The Ministry of Transport return for November of persons killed or injured in road accidents is as below. The figures in brackets are those for the corresponding period of last year:—

	Killed	Injured
England—		
Pedestrians ...	256 (217)	6,312 (5,305)
Others ...	273 (271)	11,017 (10,300)
Wales—		
Pedestrians ...	11 (7)	269 (244)
Others ...	14 (9)	390 (405)
Scotland—		
Pedestrians ...	37 (33)	825 (662)
Others ...	22 (20)	902 (774)
	613 (557)	19,715 (17,690)

The total fatalities for the preceding month were 641, compared with 618 in the corresponding period of 1938.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 50th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
L.M.S.R. (6,831¼ mls.)	£	£	£	£	£	£
Passenger-train traffic...	470,000	494,000	– 24,000	25,791,000	25,831,000	– 40,000
Merchandise, &c. ...	447,000	529,000	– 82,000	22,469,000	25,068,000	–2,599,000
Coal and coke ...	325,000	342,000	– 17,000	12,669,000	13,080,000	– 411,000
Goods-train traffic ...	772,000	871,000	– 99,000	35,138,000	38,148,000	–3,010,000
Total receipts	1,242,000	1,365,000	–123,000	60,929,000	63,979,000	–3,050,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	302,000	318,000	– 16,000	16,721,000	16,851,000	– 130,000
Merchandise, &c. ...	306,000	374,000	– 68,000	15,808,000	17,316,000	–1,508,000
Coal and coke ...	277,000	300,000	– 23,000	11,908,000	12,604,000	– 696,000
Goods-train traffic ...	583,000	674,000	– 91,000	27,716,000	29,920,000	–2,204,000
Total receipts	885,000	992,000	–107,000	44,437,000	46,771,000	–2,334,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	203,000	212,000	– 9,000	10,861,000	10,950,000	– 89,000
Merchandise, &c. ...	189,000	212,000	– 23,000	9,313,000	10,107,000	– 794,000
Coal and coke ...	121,000	139,000	– 18,000	5,393,000	5,693,000	– 300,000
Goods-train traffic ...	310,000	351,000	– 41,000	14,706,000	15,800,000	–1,094,000
Total receipts	513,000	563,000	– 50,000	25,567,000	26,750,000	–1,183,000
S.R. (2,140 mls.)						
Passenger-train traffic...	289,000	299,000	– 10,000	16,165,000	16,193,000	– 28,000
Merchandise, &c. ...	62,500	64,500	– 2,000	3,045,500	3,194,000	– 148,500
Coal and coke ...	38,500	42,500	– 4,000	1,536,500	1,556,000	– 19,500
Goods-train traffic ...	101,000	107,000	– 6,000	4,582,000	4,750,000	– 168,000
Total receipts	390,000	406,000	– 16,000	20,747,000	20,943,000	– 196,000
Liverpool Overhead ... (6½ mls.)	1,301	1,369	– 68	67,470	65,202	+ 2,268
Mersey (3½ mls.) ...	4,803	4,765	+ 38	220,676	211,887	+ 8,789
*London Passenger Transport Board ...	609,800	595,400	+ 14,400	14,239,400	14,068,900	+ 170,500
IRELAND						
Belfast & C.D. pass. (80 mls.)	1,552	1,639	– 87	121,694	125,820	– 4,126
,, ,, goods	489	* 463	+ 26	22,012	24,468	– 2,456
,, ,, total	2,041	2,102	– 61	143,706	150,288	– 6,582
Great Northern pass. (543 mls.)	8,550	8,700	– 150	546,300	549,000	– 2,700
,, ,, goods	11,200	9,800	+ 1,400	467,700	476,900	– 9,200
,, ,, total	19,750	18,500	+ 1,250	1,014,000	1,025,900	– 11,900
Great Southern† pass. (2,076 mls.)	—	—	—	—	—	—
,, ,, goods	—	—	—	—	—	—
,, ,, total	—	—	—	—	—	—

* 25th week (before pooling). † Returns not to hand when closing for press

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices Dec. 20, 1938	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	67⅜	55¾	28	—
5% Con. Prefce....	127	108	81½	+4
5% Red. Pref. (1950)	113	109	92½	—
4% Deb.	113⅝	102½	100½*	+1
4½% Deb.... ...	118	106	101½*	—
4½% Deb.... ...	124½	112	106½*	—
5% Deb.	136½	122¾	119½*	—2
2½% Deb.... ...	76	64	64½*	—
5% Rt. Charge ...	133 7/16	118	115½*	—
5% Cons. Guar. ...	133¾	116½	107½	+2
L.M.S.R.				
Ord.	36⅛	25⅝	13	+½
4% Prefce. (1923)	82½	65¾	28½	+1½
4% Prefce. ...	92½	77¾	48½	+2
5% Red. Pref. (1955)	107¾	102	69½*	—
4% Deb.	108	99¼	95½	+3
5% Red. Deb. (1952)	117½	111	108	—
4% Guar. ...	104	95⅞	84½	+4
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	4½	+½
Def. Ord.	6¼	3⅝	2⅜	—
4% First Prefce.	79½	63	26½	+2
4% Second Prefce.	31½	21	10½	+½
5% Red. Pref. (1955)	101¼	89¾	42½	+1
4% First Guar. ...	103	91⅞	71½	+2
4% Second Guar.	97⅝	85½	60½	+3½
3% Deb.	84⅛	74	69½	+3
4% Deb.	107¼	98½	89½	+3
5% Red. Deb. (1947)	113½	106½	104½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	103½	—
SOUTHERN				
Pref. Ord. ...	98⅝	83½	57	—
Def. Ord. ...	27⅞	16¾	12¾	—
5% Pref.	126 16/16	105 15/16	91½	+2
5% Red. Pref. (1964)	118	110¼	100½	—
5% Guar. Prefce.	133¾	116¾	114½	—
5% Red. Guar. Pref. (1957)	118½	111½	111½	—
4% Deb.	112	101¼	99½	+2
5% Deb.	135¾	123½	118½	—
4% Red. Deb. 1962–67	113	105	104½	—
BELFAST & C.D.				
Ord.	5	4	4	—
FORTH BRIDGE				
4% Deb.	106	99½	96½*	–1
4% Guar. ...	105¾	99	95*	–1
G. NORTHERN (IRELAND)				
Ord.	11	5	4	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	15	—
Prefce.	61	34	13	—
Guar.	94¾	69½	30½	–3½
Deb.	95	82⅛	56	–2
L.P.T.B.				
4½% "A" ...	123¾	110½	110½	+1
5% "A" ...	135	121½	119½	+2
4½% "T.F.A." ...	108¾	104	102½	—
5% "B" ...	125	114½	115½	+1
"C"	99¾	75	74½	–½
MERSEY				
Ord.	42⅝	22	20	—
4% Perp. Deb. ...	103	96¾	95½	—
3% Perp. Deb. ...	77⅝	74½	67½	—
3% Perp. Prefce.	68¾	61¼	55	—

* ex dividend

Stockholders Survey the "Square Deal"

Speeches at meeting of the British Railway Stockholders Union Limited on December 16

Sir Charles Stuart-Williams, Chairman, presided on December 16 at the sixth annual general meeting of the British Railway Stockholders Union Limited, at the Caxton Hall, Westminster, S.W.1.

Mr. Ernest Short, Assistant Secretary, read the notice convening the meeting and the auditors' report.

Sir Charles Stuart-Williams, having reviewed the fall in railway traffics and its probable effect upon dividends, said that while it appeared doubtful whether the present claim of the railways for a relaxation of restrictions would be strongly resisted, it was fairly clear that road interests would ask for some compensation in the form of lessening the regulations and taxation affecting their own traffic. It was a mistake, however, to overestimate the importance of reduced competition from professional road hauliers. In the first place something in that direction had already been done, and secondly the greater difficulty was the trader holding a "C" licence to operate vehicles for his own business. Taking 100 as the index for 1929, the number of commercial vehicles had increased to 139 in 1936, and even by a further 5 per cent. to 146 in 1937. Taking actual numbers instead of percentages, "A" licences fell from 102,855 in 1936 to 91,101 in 1937, and "B" licences from 54,590 to 53,775; against these reductions the "C" licences rose from 332,224 in 1936 to 362,380 in 1937 and such vehicles now formed about 71 per cent. of those carrying goods by road.

It seemed high time to approach the problem from the standpoint of what traffic *must* be placed upon the roads instead of what could be. In the former category was traffic which, by the short distance of its run, gave greater importance to loading and unloading, as compared with haulage plain and simple. This differentiation between short distance and long distance haulage had been adopted in other countries and it seemed that it might —indeed, must—be considered here.* Such a scheme would make no difference to the enormous number of vehicles used by tradesmen for local distribution, or to those conveying products between railhead and factory; but long-distance transport by large vans would largely cease in favour of the railways. It might be suggested that this would be putting a restriction upon trade, but he claimed that were a fair comparison made between the cost of conveying long-distance traffic by rail and by road, the railways would have nothing to fear.

Before concluding, the Chairman said he wished to pay a special tribute of thanks to Mr. Ashley Brown who was relinquishing the post of General Secretary at the end of the calendar year. He was sure they all realised what Mr. Ashley Brown had done for the union and how difficult it would be to replace him. The union owed a great deal to his inventiveness, his ready pen, and his fertility of thought. They were grateful to know that he would continue to advise them on the Council and Executive Committee. Also he wished to say something about the work of Mr. Ernest Short, who had now been with them long enough to enable them to appreciate the value of his great journalistic experience, of his contact with the Press, and of his ready and willing pen, as well as of his unfailing tact and courtesy.

Before the resolution was put to the meeting, members raised a number of points arising from the speech, to which Mr. Ashley Brown, Secretary, replied.

Mr. Ashley Brown, expressing his thanks for the tribute that had been paid to his services as Secretary, said that any man who had held his position, and had at the back of him the support of his Chairman and his Executive Committee, could not possibly have gone far wrong.

Two speakers had complained that the railways themselves were not giving the public a square deal in their services. On the contrary, he maintained that of recent years the companies had strained every nerve to improve their facilities. Another speaker had urged a stiffer attitude on the part of the railway boards in their present appeal. But the railway boards were far more conscious than themselves of the difficulties and troubles they were up against, and knew better that perhaps too stiff an attitude might do more harm than good.

When he saw the British Railways demanding a square deal and insisting they must have it *now*, he did not think they could complain that the railways were not asking for what they wanted. The companies' complaint was not against road transport, but against the State, which had enabled road transport to compete with them on unfavourable terms. They looked forward to the time when the railway companies and road transport would co-operate in the interests of this country. It was not the policy of the railway companies to create a rates war, and he hoped it would very soon be possible for the transport interests of rail and road to co-operate on charges and bring an end to unfair competition. As to keeping heavy traffic off the roads, he hoped somebody outside the railway companies would take the matter up. Pedestrians, motorists, and property owners were as much concerned with the matter as they were.

A speaker had mentioned the advantages of nationalisation on fair terms. As a theory he agreed, and clearly if they were going to get nationalisation on fair terms they would all want it. But if they waited until nationalisation was forced upon them they would have a right to bargain, whereas if they ran round asking for it they might get it on less favourable terms.

* On December 17, the Railway Companies' Association issued a statement explaining that the proposal made by Sir Charles Stuart-Williams for differentiation between short-distance and long-distance road haulage was not supported by the railways in any way. The suggestion formed no part of the railways' programme or intention

Welsh Inter-Railway Ambulance Competition

At the fifteenth annual competition for the Welsh Inter-Railway ambulance trophy, the Harry Webb Cup, six teams competed on Thursday, December 1, at the Assembly Rooms, City Hall, Cardiff; three entries were from the L.M.S.R. and three from the G.W.R. The adjudicators were Dr. W. Bowen Owen, Corps Surgeon, S.J.A.B., for the team test, which represented a railway accident; and Drs. H. Banks and A. H. Robertson, S.J.A.B., for the individual and practical tests, respectively. The contest attracted a large and interested number of spectators, including Mr. J. Storey, Assistant District Goods and Passenger Manager, L.M.S.R., Swansea; Mr. W. H. Victory, Assistant Chief Docks Manager, G.W.R., Cardiff; Mr. Trevor Roberts, Divisional Superintendent, G.W.R., Newport; Miss C. A. Ault, Ambulance Centre Secretary, G.W.R., Paddington; and local ambulance secretaries and representatives of the St. John Ambulance Brigade. At the subsequent presentation proceedings which were presided over by the Hon. John H. Bruce, Principal Secretary of the Welsh Priory of the Order of St. John, the result of the competition was announced by Alderman G. Fred Evans as under:—

	Marks
1. Brynmawr, L.M.S.R.	318
2. Aberdare, G.W.R.	282
3. Barry, G.W.R.	273
4. Llandudno, L.M.S.R.	254
5. Trawscoed, G.W.R.	249½
6. Llandrindod Wells, L.M.S.R. ...	229

The Chairman referred to the fact that during the past year the total number of first aid awards gained by members of the L.M.S.R. and G.W.R. staffs was 16,478. On the L.M.S.R., 4,047 men held the long service medal, and on the Great Western Railway 2,972 had that distinction. The Harry Webb Cup and prizes to members of the two first teams were presented by the Deputy Lord Mayor of Cardiff, Councillor R. T. Evans. A tribute was paid by the adjudicators to the high standard of work shown.

Official Notices

CONTRACTS AND TENDERS

The Butterley Co. Ltd. has received a contract for the steelwork involved in a bridge carrying Wilford Road, Nottingham, over the L.M.S.R. Nottingham to London line. The bridge has five spans and an angle of skew of approximately 45 degrees. The new road will be 50 ft. wide between parapets, which is made up of two 10-ft. footpaths and a 30-ft. road. The old ironwork to be demolished weighs 350 tons, and the weight of new steel is 230 tons. The main contractors for the work are Fletcher & Co., of Mansfield. The space between the girders will be filled in with precast concrete arches and mass concrete deck.

The Butterley Company has also secured the contract for approximately 1,200 tons of steelwork in five bridges in connection with the widening and electrification of approximately two miles of track for the G.W.R. at Ruislip. Two bridges are to carry new roads over the lines, and the other three bridges are to carry the new lines and existing lines over various roads. The total value of the steelwork is approximately £35,000. The general contractor who has placed this order with the Butterley Company is Caffin & Co. Ltd., and the contract will be of twelve months' duration.

The Egyptian State Railways Administration has placed orders for galvanised wire divided as follow:—

Trefileries & Laminoirs du Havre (ref. No. ESR 305.G8/22, total value £1,220, delivery f.o.b. Havre).

S. A. Clouteries & Trefileries des Flandres (adjudication of October 12, total cost £610, delivery free to Egyptian State Railways, Quay, Alexandria).

The Egyptian State Railways Administration has placed the following orders for signalling materials (Adjudication of October 1) divided as follow:—

Westinghouse Brake & Signal Co. Ltd.: Items 1, 7, 8, 9, 10, 11, 12, 13, and 14, total cost approximately £1,534, delivered f.o.b. London.

Tyer & Company Limited: Items 2, 3, and 4, total cost £89, delivered f.o.b. Liverpool.

Bayliss, Jones & Bayliss: Item 5, total cost £263, delivered f.o.b. Liverpool.

Bullers Limited: Item 6, total cost £100, delivery f.o.b. London.

The Egyptian State Railways Administration has placed orders for wire and cable (ref. No. ESR 334.G8/74) divided as follow:—

British Insulated Cables Limited: Items 1, 2, 3 and 5, total value £1,064, delivery f.o.b. Liverpool or Birkenhead.

General Electric Co. Ltd.: Item 4, total value £55, delivery f.o.b. London.

Phillips Electrical Works: Item 6, total value £121, delivery Gabbary Quay.

The Chesapeake & Ohio Railway has ordered 25,000 tons of steel rails and the Père Marquette Railway 3,250 tons from the Bethlehem, Inland and Carnegie-Illinois Steel companies, it is reported.

The Madras & Southern Mahratta Railway Administration has placed the following orders to the inspection of Messrs. Rendel, Palmer & Tritton:—

Superheater Co. Ltd.: Superheater header and 84 superheater elements.

Patent Shaft & Axletree Co. Ltd.: 40 carriage and wagon axles.

Soc. Commerciale d'Ougree: 5,000 bearing plates.

Petters Limited

An extraordinary general meeting of the shareholders of Petters Limited, which is now a holding company, has been called for December 30 next to approve a resolution to the effect that the name of the firm shall be changed to Associated British Engineering Limited, and also to approve an extension of its Memorandum of Association to embrace its activities as a holder of large investments in engineering concerns of an allied nature. The Brush Electrical Engineering Co. Ltd., which has acquired the oil-engine business of the company, has the right to form a new company called Petters Limited so as to preserve the goodwill attached to the name.

The Bombay, Baroda & Central India Railway Administration has placed orders to the inspection of Messrs. Rendel, Palmer & Tritton, with J. Baker & Bessemer Limited for 1,376 wagon tyres, and with Nicholson & Fieldsend Limited for 1,376 helical springs.

The Superheater Co. Ltd. has received an order from the Bhavnagar State Railway Administration for 24 superheater elements to be supplied to the inspection of Messrs. Robert White & Partners.

Enregistreur Hallade has received an order from the South Indian Railway Administration for one Hallade track recorder, to be supplied to the inspection of Messrs. Robert White & Partners.

The Madras & Southern Mahratta Railway Administration has placed orders, to the inspection of Messrs. Rendel, Palmer & Tritton, with Stahlunion Export G.m.b.H. for 6,300 pairs of fishplates for BS90BH rails and 26,500 fishbolts; and with Carters Merchants Limited, on behalf of Skoda Works Limited, for 30 pairs of wagon wheels and axles.

The L.N.E.R. is to instal a new cart weighbridge in the goods yard at Manchester Road, Bradford, capable of weighing vehicles up to 20 tons in weight.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Office of the Superintendent of Stores, Saptieh, Cairo, by January 11, for the supply of 10,000 m. of point rodding with couplings.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Stores Department, Saptieh, Cairo, by January 10, for the supply of one 30-kW mobile emergency charging set for telephone working.

Tenders are invited by the Egyptian State Railways Administration, receivable at the Stores Department, Saptieh, Cairo, by January 9, for the supply of 60,000 kg. mild steel slabs.

Electric Travelling Cranes required for Egypt

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo, by February 9, for the supply of three overhead electric travelling cranes.

Tenders are invited by the Egyptian State Railways Administration, receivable in the Chief Inspecting Engineer's Office, 41, Tothill Street, London, S.W.1, for the supply of 423,900 mild steel split pins. Tenders are also invited by the Egyptian State Railways Administration for the supply of 29 copper plates and for the supply of 200 buffer shells, receivable at the London office.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, receivable by January 11, for the supply of 104,422 m.s. cotters, 196,422 m.s. gibs, 39,252 loose jaws for plate and steel sleepers, 245,632 steel two-way keys, 33,080 spring steel fillers for steel sleepers, and 1,116 m.s. slide chairs for over-riding switches, required for the G.I.P. Railway; and 90,900 two-way keys required for the N.W. Railway.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, receivable by January 9, for the supply of a total of approximately 91,000 rail anchors.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Engineering Section), New Delhi, receivable by January 11, for the supply of quantities of switches and crossings.

Forthcoming Events

Dec. 30 (*Fri.*).—Tramway and Light Railway Society, at Inst. of Marine Engineers, The Minories, London, E.C.3, 8 p.m. "A Brief Survey of the Tramways of Germany," by Mr. Charles E. Lee.

Jan. 3 (*Tues.*).—Institute of Transport (Bristol), at Bristol Tramways and Carriage Company's Welfare Centre, 7 p.m. "The Electrification of Railways," by Mr. S. Smart.

Institute of Transport (Metropolitan Graduate), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 6 p.m. "The Organisation and Work of a Traffic Area Office," by Mr. J. Bottom.

Jan. 5 (*Thurs.*).—Engineering Public Relations Committee, at Heriot-Watt College, Edinburgh, 3 p.m. Christmas Lecture for Young People. "Ships and their Engines," by Engr.-Captain E. Smith, O.B.E.

Jan. 6 (*Fri.*).—Engineering Public Relations Committee, at Inst. of Electrical Engineers, Savoy Place, London, W.C.2, 3 p.m. Christmas Lecture for Young People. "Speed on Land and Sea and in the Air," by Capt. J. Irving.

Institute of Transport (East Midlands), at Guildhall, Nottingham, 7 p.m. "Public Service Vehicle Body Construction," by Mr. W. Hickman.

Omnibus Society, at Inst. of Marine Engineers, The Minories, London, E.C.3, 7 p.m. Annual General Meeting. Address by Mr. Charles E. Lee.

Southern Railway (London) Lecture and Debating Society, at Chapter House, St. Thomas' Street, London Bridge, S.E.1, 5.45 p.m. Debate with G.W.R. (London) Lecture and Debating Society. "That the Amalgamation of the Great Western and Southern Railway Companies is in the interests of the Public." Affirmative: G.W.R. Society. Negative: Southern Railway Society.

Jan. 7 (*Sat.*).—Stephenson Locomotive Society (Midlands-Northern), at 4, Bury Old Road, Manchester, 6.30 p.m. "Step-Children of the Locomotive World," by Mr. J. Kite.

Jan. 9 (*Mon.*).—G.W.R. (Birmingham) Lecture and Debating Society, at Great Western Hotel, Snow Hill Station, 6.30 p.m. Members' Debate.

Institute of Transport (London), at Inst. of Electrical Engineers, Savoy Place, W.C.2, 5.30 p.m. "Passenger Transport by Road in Relation to Railway Services," by Col. A. Redman, C.B.

Permanent Way Institution (London), at Underground Railways Dining Club, Pelham Street, S.W.7, 7 p.m. "Flat Bottom Track," by Mr. N. Swinnerton.

Stephenson Locomotive Society (London), at King's Cross Station, L.N.E.R., 6.30 p.m. "The Highland Railway," by Mr. C. Hamilton Ellis.

Jan. 10 (*Tues.*).—Institute of Metals (North-East Coast), at King's College, Newcastle, 7.30 p.m. "Mechanisation in the Foundry."

Institute of Transport (Birmingham), at Queen's Hotel, 6 p.m. "Transport from an Industrialist's Point of View," by the Rt. Hon. the Earl of Dudley, M.C.

Institute of Transport (Leeds), at Hotel Metropole, 6.30 p.m. "Organising a National Transport System," by Mr. F. Smith.

Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. "The Conditions of Engineering Contracts," by Mr. E. Rimmer.

Permanent Way Institution (York), at Railway Inst., Queen Street, 6.30 p.m. "Concrete in Railway Construction," by Mr. N. Dryland.

Jan. 11 (*Wed.*).—Diesel Engine Users Association, at Caxton Hall, Caxton Street, London, S.W.1, 5 p.m. Discussion: "Report on Heavy-Oil Engine Working Costs, 1937-38."

Institution of Locomotive Engineers (London), at Inst. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Discussion: "Minimising Risk of Destruction in Railway Collisions."

Jan. 12 (*Thurs.*).—G.W.R. (London) Lecture and Debating Society, in General Meeting Room, Paddington Station, 5.45 p.m. Debate with Bank of England Debating Society.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: Dec. 20, 1938	Prices: Yield (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	11.12.38	13,960	– 849	50	735,750	833,340	– 97,590	Ord. Stk.	29	10 1/4	9	Nil
	Argentine North Eastern	753	10.12.38	8,530	—	24	246,650	231,870	+ 14,780	,,	19 1/4	6	5 1/2	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93 1/2	60	70	5 11/16
	Bolivar	174	Nov., 1938	2,900	+ 300	48	40,100	55,650	– 15,550	6 p.c. Deb.	9 1/2	5	8 1/2	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	5 1/2	9 1/16
	Buenos Ayres & Pacific	2,806	10.12.38	85,670	+ 7,506	24	1,727,919	1,877,483	– 149,564	Ord. Stk.	17 1/8	5 1/2	5 1/2	Nil
	Buenos Ayres Central	190	3.12.38	$105,400	+ 4,300	23	$2,677,100	$3,056,700	– $379,600	Mt. Deb.	41 1/2	18	17	Nil
	Buenos Ayres Gt. Southern	5,084	10.12.38	136,600	– 2,730	24	2,923,945	2,946,464	– 22,519	Ord. Stk.	33 3/4	13 1/2	13	Nil
	Buenos Ayres Western	1,930	10.12.38	54,218	+ 7,692	24	960,980	1,088,152	– 127,172	,,	31 5/4	11 1/4	10 1/4	Nil
	Central Argentine	3,700	10.12.38	105,124	– 19,178	24	2,417,854	3,022,317	– 604,463	,,	34 1/4	10 5/4	11	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	20 1/2	4 1/2	4	Nil
	Cent. Uruguay of M. Video	972	3.12.38	21,505	+ 826	23	399,604	375,550	+ 24,054	Ord. Stk.	67 32	2	2	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6 1/4	1 1/2	3	Nil
	Costa Rica	188	Oct., 1938	19,893	– 2,687	18	94,876	101,026	– 6,150	Stk.	38	27	24	8 5/16
	Dorada	70	Nov., 1938	14,300	— 1,500	48	178,100	170,100	+ 8,000	1 Mt. Db.	107	106	103 7/8§	5 15/16
	Entre Rios	810	10.12.38	14,634	+ 1,346	24	365,797	320,400	+ 45,397	Ord. Stk.	19 7/16	6	7	Nil
	Great Western of Brazil	1,092	10.12.38	13,600	+ 1,300	50	379,100	403,900	– 24,800	Ord. Sh.	3/4	1/8	1/4	Nil
	International of Cl. Amer.	794	Oct., 1938	$390,826	– $49,094	44	$4,580,780	$4,780,933	– $200,153	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/	1/–	1/2	Nil
	La Guaira & Caracas	22 3/4	Nov., 1938	3,995	– 870	48	57,105	56,685	+ 420	Stk.	8 1/2	6	7 1/2	Nil
	Leopoldina	1,918	10.12.38	24,132	+ 3,294	50	1,064,382	1,147,753	– 83,371	Ord.Stk.	9 1/4	3	2	Nil
	Mexican	483	14.12.38	$259,100	– $42,000	24	$6,258,600	$7,044,100	– $785,500	,,	1 1/2	1/4	1/8	Nil
	Midland of Uruguay	319	Nov., 1938	9,206	– 292	22	43,352	42,563	+ 789	,,	1 7/8	1/2	1/2	Nil
	Nitrate	386	15.12.38	4,477	– 772	50	137,283	144,762	– 7,479	Ord. Sh.	3 1/16	2	1 5/8	6 1/16
	Paraguay Central	274	10.12.38	$4,808,000	+ $415,000	24	$72,891,000	$78,304,000	– $5,413,000	Pr. Li. Stk.	84	79 1/4	55 1/2§	5 7/16
	Peruvian Corporation	1,059	Nov., 1938	62,331	– 16,846	22	340,673	427,128	– 86,455	Pref.	14 5/4	4 1/2	2 3/4	Nil
	Salvador	100	10.12.38	¢24,350	+ ¢9,670	24	¢307,214	¢311,525	– ¢4,311	Pr. Li. Db.	23 1/2	21 1/2	19 1/2	Nil
	San Paulo	153 1/2	4.12.38	29,375	– 4,510	49	1,498,232	1,574,563	– 76,331	Ord. Stk.	98 1/2	56	32	12 1/2
	Taltal	160	Nov., 1938	1,730	– 1,735	22	13,515	16,350	– 2,835	Ord. Sh.	1 7/16	11/16	5/8	16
	United of Havana	1,353	10.12.38	12,384	– 2,344	24	367,588	390,523	– 22,935	Ord. Stk.	5 8	31 32	1	Nil
	Uruguay Northern	73	Nov., 1938	1,305	+ 379	22	5,203	4,309	+ 894	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,721	14.12.38	705,647	– 11,344	50	34,822,208	37,903,925	– 3,081,717	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62 1/2	69 1/2	5 5/8
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	101 7/8	94 1/2	101 1/2	3 15/16
	Canadian Pacific	17,186	14.12.38	548,200	+ 2,800	50	27,197,200	27,681,200	– 484,000	Ord. Stk.	18	7 1/4	6	Nil
Indian†	Assam Bengal	1,329	30.11.38	47,205	+ 5,329	34	984,899	914,400	+ 70,499	Ord. Stk.	86	73 1/2	77 1/8§	3 7/8
	Barsi Light	202	30.11.38	2,970	+ 285	34	96,157	87,202	+ 8,955	Ord. Sh.	66 1/2	46	58 1/2	6 11/16
	Bengal & North Western	2,108	30.11.38	74,400	– 6,509	10	442,452	453,134	– 10,683	Ord. Stk.	317	301	275§	6 9/16
	Bengal Dooars & Extension	161	30.11.38	4,935	– 281	34	103,949	101,712	+ 2,237	,,	100	84	87 1/2	7 7/16
	Bengal-Nagpur	3,268	30.11.38	170,850	– 33,743	34	4,495,417	4,592,965	– 97,548	,,	101	89	93 1/2	4 1/4
	Bombay, Baroda & Cl. India	3,085	10.12.38	248,775	– 75	36	5,919,825	6,006,750	– 86,925	,,	113	110 1/2	107 1/2	5 9/16
	Madras & Southern Mahratta	2,967	30.11.38	142,350	+ 260	34	3,624,333	3,432,852	+ 191,481	,,	110	105	102 1/2	7 5/16
	Rohilkund & Kumaon	571	30.11.38	13,143	– 193	10	74,906	73,975	+ 931	,,	314	302	278§	6 1/2
	South Indian	2,531 1/2	20.11.38	101,415	+ 1,330	32	2,634,700	2,658,480	– 23,780	,,	103 1/2	99 1/2	100 1/2§	5
Various	Beira-Umtali	204	Oct., 1938	77,765	– 17,949	4	77,765	95,714	– 17,949	—	—	—	—	—
	Egyptian Delta	620	30.11.38	6,943	– 63	34	150,155	160,765	– 10,610	Prf. Sh.	31/	5/4	1/2	Nil
	Kenya & Uganda	1,625	Aug., 1938	182,150	– 14,527	35	1,860,357	1,920,155	– 59,798	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	48 1/8	43 1/2	47	7 7/16
	Midland of W. Australia	277	Oct., 1938	17,170	+ 421	18	61,856	54,675	+ 7,181	Inc. Deb.	98	93 1/2	95§	4 5/16
	Nigerian	1,900	5.11.38	24,715	– 36,837	32	940,611	1,484,021	– 543,410	—	—	—	—	—
	Rhodesia	2,451	Oct., 1938	386,983	– 80,380	4	386,983	467,363	– 80,380	—	—	—	—	—
	South Africa	13,285	3.12.38	668,962	– 39,699	36	22,000,969	22,853,243	– 852,274	—	—	—	—	—
	Victoria	4,774	Sept., 1938	757,548	+ 28,434	13	2,236,796	2,150,206	+ 86,590	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

† Receipts are calculated @ 1s. 6d. to the rupee § ex dividend

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Diesel Railway Traction

Diesel Engine Starting

A RECENT symposium on the starting of oil engines presented by the Diesel Engine Users Association was based mainly upon practice as it affects the large, slow and heavy type of engine, but some notes presented by Mr. J. H. Pitchford on behalf of Ricardo & Co. (1927) Ltd., referred particularly to small high-speed types, as used in light-weight railcars. As regards starting in cold weather it has been shown experimentally that over a range of about 10° C. either side of zero, the air intake temperature is something like three times as important a factor as jacket water temperature. The optimum compression ratio for any particular type or size of engine usually represents a compromise between the beneficial effect of a high ratio on starting and smooth transition from compression to ignition, and its bad effect on the maximum load carrying capacity of the engine. In the indirect injection type of engine much can be done towards easier starting if the fuel jets, or one of them, are arranged so that at starting speeds atomised fuel reaches some stagnant, and therefore high temperature, zone in the combustion chamber. Such a principle is used in the Ricardo Whirlpool and Perkins heads. The Whirlpool head is of the true compression swirl type, but a certain cold start is possible by hand down to an air and jacket temperature of − 8° C. on ordinary commercial fuel oil, without the use of glow plugs or other extraneous methods. Starting conditions are sometimes made unnecessarily severe by the use of too viscous a lubricating oil, but an oil between the limits of 800 and 1,600 centipoises at 0° C. on the absolute viscosity scale is usually quite suitable for cold starts. Provision at starting of two to two-and-a-half times the normal amount of full load fuel is another means of promoting quick firing, and advanced injection timing is a further method, but one which can be abused if it is under manual control. Fuel or lubricating oil may also be introduced into the intake ports before starting, and has been shown by experiment to reduce considerably the cylinder bore wear resulting from corrosion under cold starting conditions. One other method of promoting easy starting, which was not mentioned in the D.E.U.A. symposium, is that adopted by Ganz. At starting, the inlet valves are not opened at the beginning of the suction stroke, but towards the end. An appreciable vacuum is thus created in the cylinder during the first part of the stroke, and when the air is admitted its temperature is raised considerably by the fact of its flowing into a vessel subjected to a lesser pressure. A special set of cams is provided for this purpose, and they are changed to normal setting as soon as the engine is firing regularly.

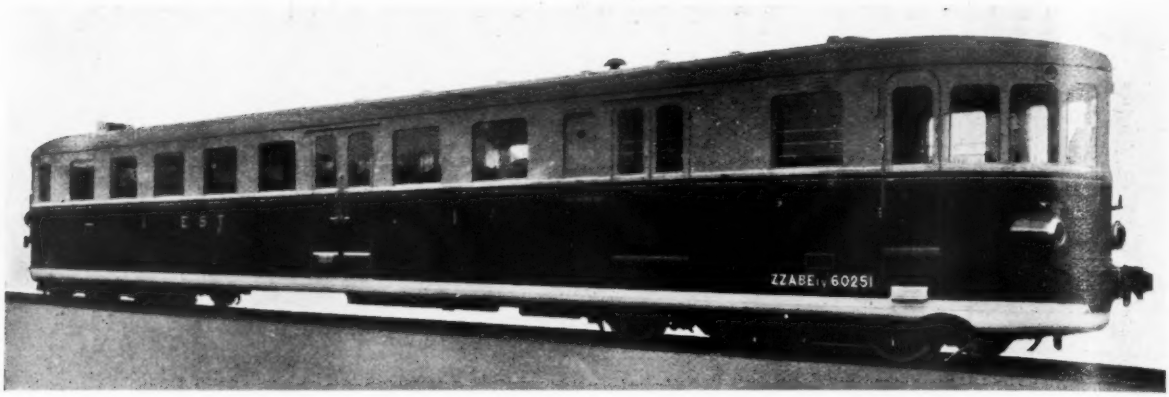
Diesel Streamliners Earn Money

IN a report on over 70 high-speed luxury trains in the U.S.A., Messrs. Coverdale & Colpitts, American consulting engineers say that every lightweight streamlined train operating in that country has produced additional passenger traffic and substantial earnings for its owners. The highest ratio of earnings of any train of this type in the year ended June 30 last was produced by the Burlington Lines' diesel-electric Denver Zephyrs. Building up a gross revenue of $2,088,938, these Zephyrs earned a net of $1,568,831. This represented 75·1 per cent. of the gross, or $2·07 per train-mile. Other equally significant findings included the development of the Zephyr service between Chicago and the Twin Cities, where service was started with twin three-car trains in 1935, and grew to two seven-car trains by 1937 because of increasing demand for accommodation. In fleet operation, the Burlington Zephyrs produced $4,032,763 gross revenue for the year. The net earning was $1·28 a mile.

The Santa Fé, with the largest fleet of streamlined trains, actually had only one of these, the Super-Chief, in operation before the beginning of 1938, but these trains still produced $1,306,928 in gross revenue, with a net earning of $1·27 a mile. The Rock Island Rocket fleet of six diesel-electric trains showed $1,242,614 in gross earnings for the year, despite the fact they were not placed in service until the early fall of 1937. Net earnings showed $0·84 per train-mile. The five North Western-Union Pacific diesel streamliners produced $3,154,338 gross revenue. Net earnings amounted to $1·08 per train-mile. The City of San Francisco, operated jointly by the North Western, Union Pacific and Southern Pacific, showed the highest net revenue per train mile, *viz.*, $2·529. The report pointed particularly to the growth of traffic on the Santa Fé 3,600 b.h.p. diesel-electric Super-Chief. This new lightweight, stainless steel Super-Chief was placed in service between Chicago and Los Angeles in May, 1937. In February, 1938, a second train was added to provide twice-a-week service. Revenue for the period January 1 to June 30, 1937, was $238,581; from July 1 to December 31, 1937, it grew to $306,286, and for January 1 to June 30, 1938, to $488,072.

From the opinions of railroad officials, the report says, it is clear that a large proportion of the traffic on these trains has been newly created. The outstanding facts, however, which the statements in the report reveal in striking manner, are the great popularity and the high degree of financial success attained in the operation of lightweight, high-speed streamline trains. The first so-called streamliners went into service in 1934, with the inauguration of the City of Salina by the Union Pacific and the Pioneer Zephyr by the Burlington. Both were three-car trains and were followed by the six-car City of Portland on the Union Pacific and the Flying Yankee on the Boston & Maine. Then the Burlington put into service its 600 b.h.p. three-car sets on the Chicago-Twin Cities 66 m.p.h. schedule, to be replaced about two years ago by the 1,800 b.h.p. seven-car stainless steel sets. The Illinois Central streamliner, the Green Diamond, is a 1,200 b.h.p. train set to work in 1935, and other streamliners in service include the four-car Mark Twain and the 3,000 b.h.p. Denver Zephyrs on the Burlington Lines, the City of Denver on the Union Pacific, and the 12-car and 17-car trains running between Chicago and California on the Union Pacific.

EXPRESS RAILCAR SERVICES IN THE EASTERN REGION OF FRANCE

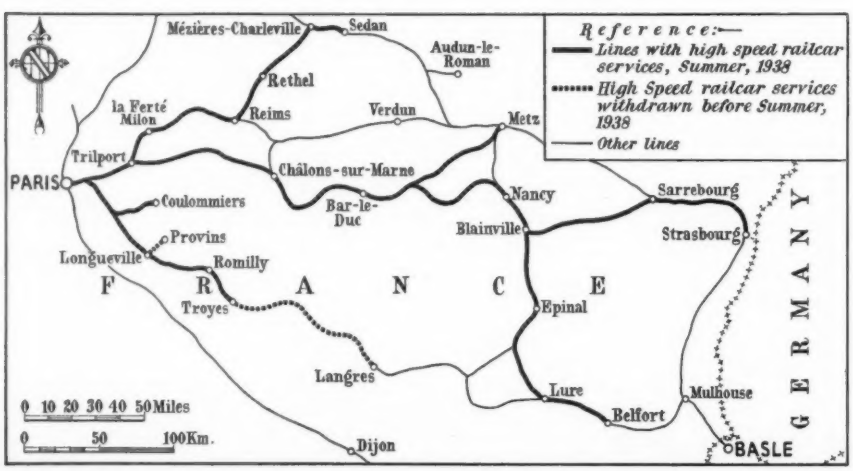


320 b.h.p. double-engined De Dietrich diesel-mechanical railcar

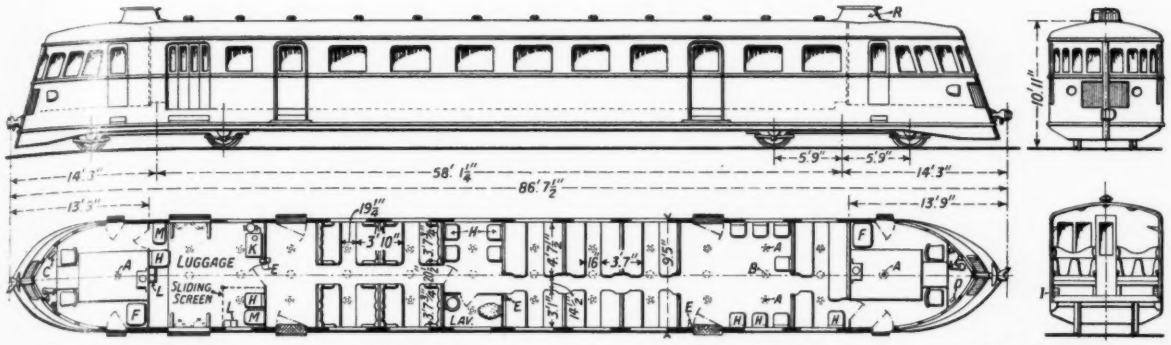
THE withdrawal of express railcar services between Paris, Charleville, Troyes, and Nancy has removed some of the most notable of the high-speed business service railcars in France. The morning Paris—Nancy car had 40 to 70 per cent. of its seats occupied during the 18 months it was running, and the Paris—Langres car 90 to 100 per cent. There are still two high-speed railcars in each direction daily over the Nancy route, the 17.30 Paris—Strasbourg and 19.50 Paris—Nancy in the down direction and the 7.22 from Nancy and the 8.05 from Strasbourg in the up. This particular Strasbourg service was introduced only with the last summer timetables, and was worked by the Nord triple-car diesel-electric trains until the new three-car Bugattis were ready.

The high-speed long-distance services on the old C. de f. de l'Est may be traced back to August, 1935, when a railcar began to run early in the morning from Paris to Charleville, the traffic as far as Rheims being principally newspapers. The return trip left Charleville at 9.25 and arrived in Paris at 12.50. In the summer of 1936, a fast evening railcar was introduced, leaving Paris at 17.05 and arriving back at 23.30, and in November of the same year it was prolonged to Sedan. The Nancy service began in May, 1936, with a railcar leaving Nancy at 7.05 and reaching Paris at 10.20, the return journey beginning at 20.00. The Metz connecting service was begun at the same time, and for a period the car which operated this service gave an additional fast train to and from Paris, but at a long interval after the Nancy car (up direction) and before (down direction). Later, another service was instituted between Paris and Langres, and in June, 1937, one of the Nancy services was prolonged to Strasbourg.

With the Paris—Nancy, Paris—Metz, Paris—Charleville, Paris—Sedan, Paris—Coulommiers, and Paris—Provins services in operation there were five railcar turns a day, operated by five 320 b.h.p. De Dietrich and two Renault VH 265 b.h.p. railcars. On the first turn the car made two return trips between Paris and Coulommiers between 7.30 and 14.00 and then worked the down evening service to Nancy, the daily kilometrage being 669 (415 miles). The next day it operated the second turn by providing the morning service from Nancy to Paris and then making the evening return trip between Paris and Sedan, covering a distance of 881 km. (548 miles). The second roster began with the car leaving Paris at 16.45, running to Bar-le-Duc, and after a three-hour halt there,



Map showing routes of the old C. de fer de l'Est over which rapide and express railcar services have been operated. Apart from the Nancy-Belfort line, all services were operated by cars shedded at Noisy-le-Sec, Paris



A—Roof and ceiling lamps
B—Ventilators
C—Flaman speed recorder
D—Flaman speed indicator
E—Passengers' emergency brake
F—Fuel tanks
H—Tip-up seats
I—Heaters
K—Heating boiler
L—Toolbox
M—Removable table
R—Exhaust outlet

Diagram of double-engined De Dietrich railcar of the type used on fast services

continuing to Metz, a distance of 354 km. (220 miles in the day). On the second day, the route was from Metz to Bar-le-Duc, a return trip between that town and St. Dizier, and then an afternoon trip to Paris, giving a distance of 442 km. (275 miles) for the day. Two De Dietrich cars were at work on each of these double rosters each day, with the fifth car held as a spare at Paris, and on each turn the full working was concentrated in one or two periods, leaving ample time for any maintenance work. The Renault cars were kept to the Provins and morning Charleville services, the car in use making its daily distance of 676 km. (420 miles) between 2.45 and 12.50, and from 22.15 to 23.45. These arrangements were modified to some extent with the introduction of the Langres trip and the second service to Nancy.

Miles	Metz Connecting Services				
0.0	22.09	dep. ..	Bar-le-Duc ..	arr. ..	8.13
62.0	23.07	arr. ..	Metz	dep. ..	7.15

Miles	Paris-Coulommiers Line				
0.0	6.55	dep. ..	Paris	arr. ..	17.16
51.5	7.48	arr.	Coulommiers	dep. ..	16.22
	7.50	dep.		arr. ..	16.20
	stops at all stations			stops at all stations	
88.8	9.12	arr. ..	Sezanne ..	dep. ..	14.58

During a six-month period on the services noted above, the Paris—Nancy cars covered 131,879 km. against 133,216 km. booked; the Paris—Charleville—Sedan cars 94,708 km. against 95,298 km. booked; the Paris—Metz cars 133,011 km. against 133,584 booked; and the Paris—Langres cars 109,058 km. compared with 109,296 km. booked, the availability in every case being over 98 per cent. During this period the lost time booked against the rail-cars in actual service was 108 min. on the Nancy route, 98 min. on the Sedan route, 12 min. on the Metz service, and 64 min. on the Langres line. The high-speed services of the Eastern Region of the French National Railways centred in Paris during the past summer were as given in the accompanying tables; one of the Strasbourg runs is now worked by triple-car Bugattis.

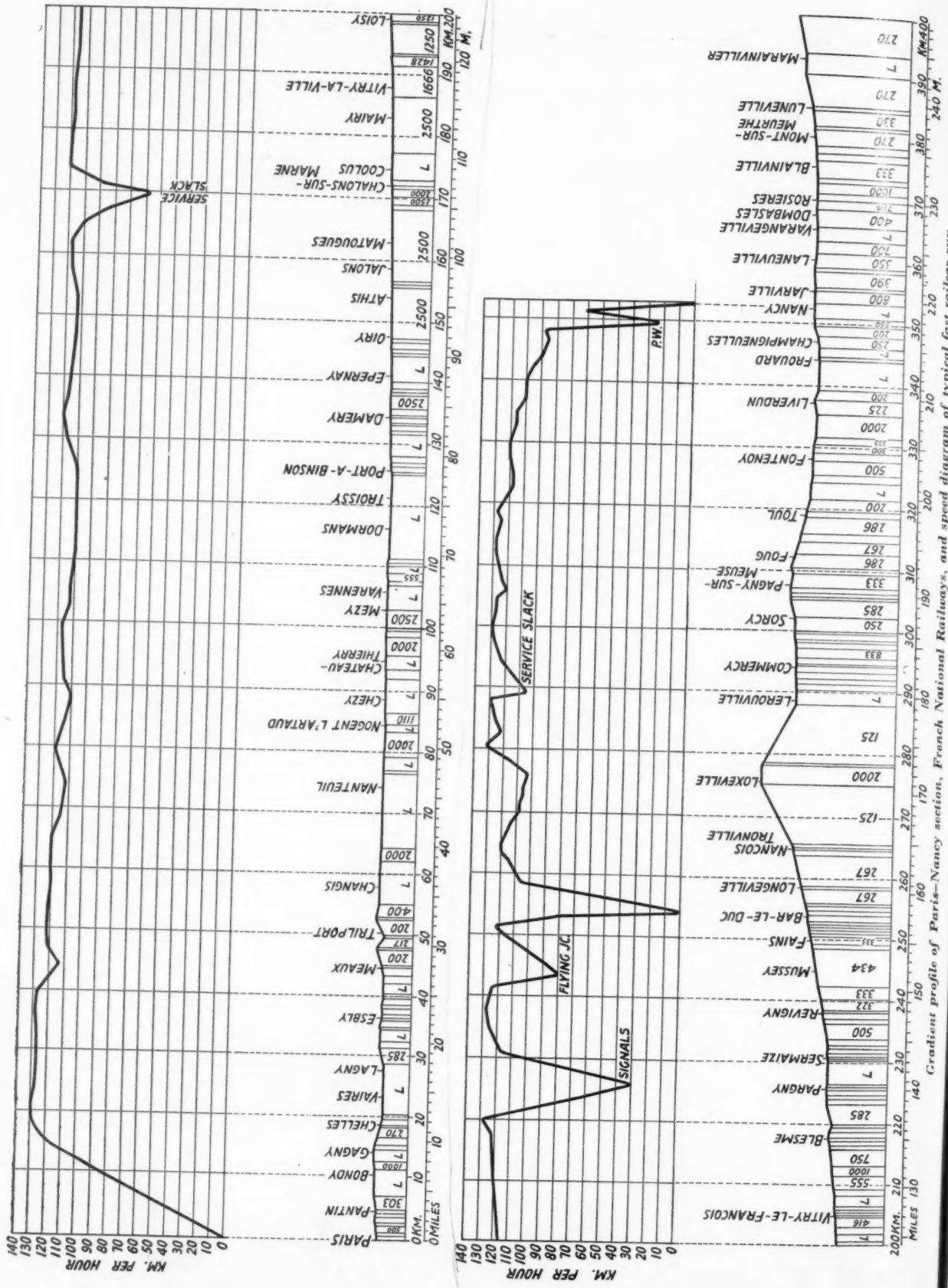
All the cars operating these services are shedded at Noisy-le-Sec, on the outskirts of Paris. Before the second Strasbourg service began they comprised six 320 b.h.p. De Dietrich and three Renault ABV 500 b.h.p. twin-car sets, which covered an average of 350 km. (217 miles) a day inclusive of any vehicles standing in reserve or under repair. Incidentally, the whole railcar stud of the old Est line, comprising nearly 100 local, semi-fast, and express railcars, averages 240 km. (149 miles), including cars in reserve or under repair, and with a scheduled annual mileage of about 5,000,000 have an availability of over 95 per cent. When the Nord triple-car diesel electric trains began the second Strasbourg service last summer, they were kept at their own depot at La Chapelle, and ran to and from the Gare de l'Est *via* the Ceinture line.

Miles	Paris-Strasbourg Route							
0·0	8.0	17.35	19.50	dep. ..	Paris	arr. ..	10.35	12.30
157.7	10.17		22.04	arr.	Bar-le-Duc ..	dep. ..	8.20	
	10.19		22.06	dep.		arr. ..	8.18	
219.5	11.16	20.37	23.02	arr.	Nancy ..	dep. ..	7.22	9.30
		20.41	23.04	dep.		arr. ..	7.20	9.26
312.5		22.00	0.25	arr. ..	Strasbourg ..	dep. ..	6.0	8.05

Miles	Paris-Sedan Route			
0.0	17.00	dep. ..	Paris	12.46
				*
97.0	18.34	arr. ..	Rheims	10.45
	18.36	dep. ..		10.39
121.7	19.01	arr. ..	Rethel	10.11
	19.02	dep. ..		10.10
151.5	19.37	arr. ..	Mezieres-Ch. ..	9.33
	19.39	dep. ..		9.30
162.0	19.53	arr. ..	Sedan	9.12

* Intermediate stops at Sismes, Oulchy-Breny, and La Ferté Milon.

Miles	Express Services, Nancy–Belfort Cross-Country Route									
0·0	5.56	11.36	16.03	19.40	dep. ..	Nancy	arr. ..	8.22	15.20	19.08	21.47
	7	7	4	8	No. of intermediate stops			6	6	5	6
113·5	8.22	14.07	18.25	22.19	arr. ..	Belfort	dep. ..	5.55	12.58	16.42	19.10


PARIS
PANTIN
BONDY
GAGNY
CHELLES
VAIRES
LAGNY
ESBLY
MEAUX
TRILPORT
CHANGIS
NANTEUIL
NOGENT L'ARTAUD
CHEZY
CHATEAU-THIERRY
MEZY
VARENNES
DORMANS
TROISSY
PORT-A-BINSON
DAMERY
EPERNAY
OIRY
ATHIS
JALONS
MATOUGUES
CHALONS-SUR-MARNE
COOLUS
MAIRY
VITRY-LA-VILLE
LOISY
SERVICE SLACK
KM. PER HOUR
OKM.
OMILES
MARAINVILLER
LUNEVILLE
MONT-SUR-MEURTHE
BLAINVILLE
ROSIERES
DOMBASLES
VARANGEVILLE
LANEUVILLE
JARVILLE
NANCY
CHAMPIGNEULLES
FROUARD
LIVERDUN
FONTENOY
TOUL
FOUG
PAGNY-SUR-MEUSE
SORCY
COMMERCY
LEROUVILLE
LOXEVILLE
NANCOIS TRONVILLE
LONGEVILLE
BAR-LE-DUC
FAINS
MUSSEY
REVIGNY
SERMAIZE
PARGNY
BLESME
VITRY-LE-FRANCOIS
SERVICE SLACK
FLYING JC.
SIGNALS
P.W.
KM. PER HOUR
200KM.
MILES
Gradient profile of Paris—Nancy section, French National Railways, and speed diagram of typical fast railcar run

4 3/6

De Dietrich cars were used on the Paris—Nancy, Langres and Charleville runs, and on the Langres journey traffic often necessitated two cars being coupled together in multiple unit. On the Charleville line a Renault 300 b.h.p. ABJ railcar took the place of the De Dietrich for the early morning journey. The first Strasbourg service was maintained by the twin-car Renault sets, each unit making a single trip, 503 km. (312½ miles) each day, with one set held in reserve. For much of the distance between Paris and Nancy, and also on sections of the Charleville and Langres lines, a top speed of 130 km.p.h. (81 m.p.h.) is permitted; otherwise the limit is the French legal maximum of 120 km.p.h. (75 m.p.h.).

Railcar Design

The 320 b.h.p. De Dietrich cars seat 16 first and 39 second class passengers on a tare weight of 35·5 metric *tonnes*; including 1½ *tonnes* of baggage, the gross weight is about 42 *tonnes*. The leading dimensions can be obtained from the accompanying diagram. On each bogie is mounted a Saurer BXD engine set to give a maximum output of 160 b.h.p. at 1,500 r.p.m. from six 134 mm. by 180 mm. cylinders. The cylinders of the French Saurer BXD engine are 4 mm. greater in diameter than the standard model of the Swiss parent firm. Mounted on the bogie and driven by the engine is a four-speed constant-mesh pre-synchronised gearbox of the Mylius type, proportioned to give on top gear the maximum speed of 130 km.p.h. at an engine speed of 1,450 r.p.m. Different gear ratios are used in other cars of the same make for services where the maximum permissible speed ranges from 110 to 120 km.p.h. (68-75 m.p.h.). Multiple-unit control is fitted, and either or both engines can be controlled from both driving positions in a car or from the driving position in use when two or more cars are in service.

Miles			8.0 a.m. car	8.0 a.m. car
0·0	Paris (Est)	dep.	0·00	0·00
6·4	Bondy		9·07 (81)	9·08
8·7	Gagny		11·22 (113)	11·18 (125)
17·0	Lagny		17·45 (128)	17·52
22·5	Esbly		21·51 (129)	22·05
27·4	Meaux		25·43 (112)	26·03
35·8	Changis		32·29 (120)	
45·8	Nauteuil		40·41 (112)	
52·0	Nogent		45·47 (113)	
58·7	Chateau Thierry		51·30 (116)	51·06 (120)
65·9	Varennes		57·38 (112)	
72·3	Donnans		63·14 (110)	(103)
87·8	Epernay		76·47 (118)	77·06 (120)
95·6	Athis		83·32 (113)	(25)†
106·9	Chalons-sur-Marne		94·35 (68)*	93·32 (65)*
113·5	Mairy		99·43 (119)	
116·6	Vitry-la-Ville		102·10 (118)	106·23
123·5	Loisy		107·57 (116)	
127·2	Vitry-le-François		111·05 (118)	114·42
134·8	Blesme		117·15 (121)	
139·9	Pargny		121·47 (30)†	
143·4	Sermaize		125·50 (117)	
147·5	Revigny		129·17 (128)	††
151·8	Mussey		133·06 (80)*	138·35
155·1	Fains		135·55 (117)	
157·7	Bar-le-Duc	arr.	138·09	143·45
0·0		dep.	0·00	0·00
3·1	Longeville		4·16 (106)	4·21
6·8	Nancois Trouville		7·36 (120)	7·33 (129)
13·6	Loxeville		13·31 (103)	12·50 (117)
21·7	Lerouville		20·04 (105)*	19·15
25·5	Commercy		23·08 (123)	
33·5	Pagny		29·42 (123)	28·30
41·0	Toul		35·08 (128)	34·01
46·5	Fontenoy		39·36 (120)	
58·2	Champigneulles		50·08 (96) (22)†	† ††
61·8	Nancy	arr.	55·49	56·55

* Service slack. † Sigs. Figs. in brackets speed in km.p.h.

Everyday Performance

Logs of typical runs on the Nancy and Charleville sections are given herewith. The booked time from Paris to Bar-le-Duc, 157½ miles, is 134 min., a start-to-stop average of 70½ m.p.h. After a 2-min. stop the 61½ miles on to Nancy are scheduled to be covered in 56 min., an average of 66 m.p.h., and this section includes six miles uphill at 1 in 125. On experimental runs in 1936 a time of 170 min. was achieved between Paris and Nancy 219 miles inclusive of a short stop at Bar-le-Duc, the overall average speed being 125 km.p.h. (77½ m.p.h.) with a top speed of 138 km.p.h. (85¾ m.p.h.). The extraordinary accelerative powers of the railcars are partly brought out by the tables and speed graph. At Bar-le-Duc on the first run the car was running at 75 km.p.h. (46½ m.p.h.) at the end of the platform, but was brought to a standstill easily and smoothly opposite the waiting Metz car. On the same run, after the permanent way check to 30 km.p.h. at Pargny, the acceleration along level track was from 30 to 40 km.p.h. in 8 sec., from 30 to 50 km.p.h. in 18 sec., from 30 to 60 km.p.h. in 32 sec., from 30 to 70 km.p.h. in 50 sec., from 30 to 80 km.p.h. in 67 sec., and from 30 to 95 km.p.h. in 118 sec.; in 4·9 km., all level, speed increased from 30 to 117 km.p.h. Up the 10 km. of 1 in 125 to Loxeville speed fell from 120 to 103 km.p.h. On the second run in the table the railcar met with several signal checks, but put up a very fine performance between Bar-le-Duc and Nancy, going up the 10 km. (6·2 miles) of 1 in 125 at a minimum of 117 km.p.h. (73 m.p.h.), and covering 56¾ consecutive miles in 47¾ min.

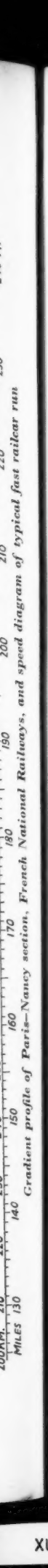
Taken generally, the riding of these cars is excellent, and there is rather less noise from both track and engine than is usual. The former, at least, is probably due to rubber blocks inserted in the wheels. The seats are quite comfortable but the leg room is scarcely enough for long journeys if the car is fairly full.

Maintenance and Repair

These De Dietrich express railcars are capable of running 150,000 km. (93,000 miles) without needing any other attention than the usual periodical inspections and light repairs after every 25,000 km. (15,500 miles). One of these vehicles was taken out of service deliberately after covering 100,000 km. (62,000 miles) for the purpose of general inspection and complete overhaul of the engines. No measurable wear was found on the crankshaft, main roller bearings, crankpins, connecting-rod bearings, pistons, or camshaft. The maximum wear on the renewable liners was 0·14 mm., near the top position of the first pressure ring. After a run of 150,000 km. the engines of the same car showed practically negligible wear on the essential parts just mentioned, but liner wear, partly due to a case of overheating, was 0·2 mm., and therefore new liners were fitted. In regular service the power-transmission unit now covers 150,000 km. (93,000 miles) between heavy repairs.

As the location and mounting of the engine on the bogie permits the replacement of the main constituents (except the crankshaft) without dismantling, the condition of the lubricating pipes of the unit mentioned above was carefully noted over a period. Actually, silting did not vary appreciably between 80,000 and 150,000 km. (50,000 and 93,000 miles), after which distance the lubricating feed pipes were still in very good condition. Incidentally, the general condition of these De Dietrich 320 b.h.p. units is quite satisfactory after mileages of 150,000 to 160,000 km. (93,000 to 100,000 miles).

(*Continued on page* 1125)



SOME NOTES ON ENGINE MOUNTING

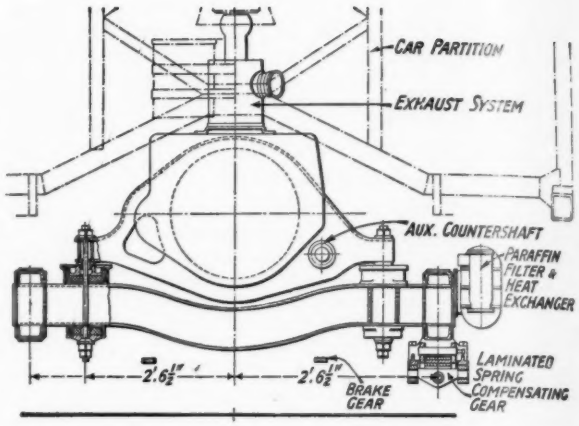
By a correspondent

THE mounting of railway oil engines, whether it be on the bogie, underframe, or subframe, seems to cause engineers and engine builders a lot of worry. Flexible, semi-flexible and rigid types are to be found in all three categories mentioned above, and there are almost countless variations designed to give accessibility or easy withdrawal, such as the arrangement of the end of a car underframe as a bolted framework which can be loosened and withdrawn from the main structure with engine and transmission in position.

The bugbears of flexible mountings are idling, which speed is often too near the natural vibration period of rubber shock absorbers, and the passage through this period every time the engine is started or stopped. This not only causes discomfort to passengers, but damages the exhaust pipes, fuel lines, water connections and auxiliary and main drives. Further, the deterioration of the rubber type of support tends to make the natural frequency rise into the range of the lower running speeds. It is really essential that the movement permitted by the flexible mounting should be small enough under the worst conditions to prevent damage to the constituents named above, and if a mounting with a variable deflection rate can be arranged it will tend to reduce the stresses on the supporting structure. It must be recognised, too, that frequently flexible and other mountings have to cater for cylinder arrangements or firing orders which are not the best from a vibration point of view.

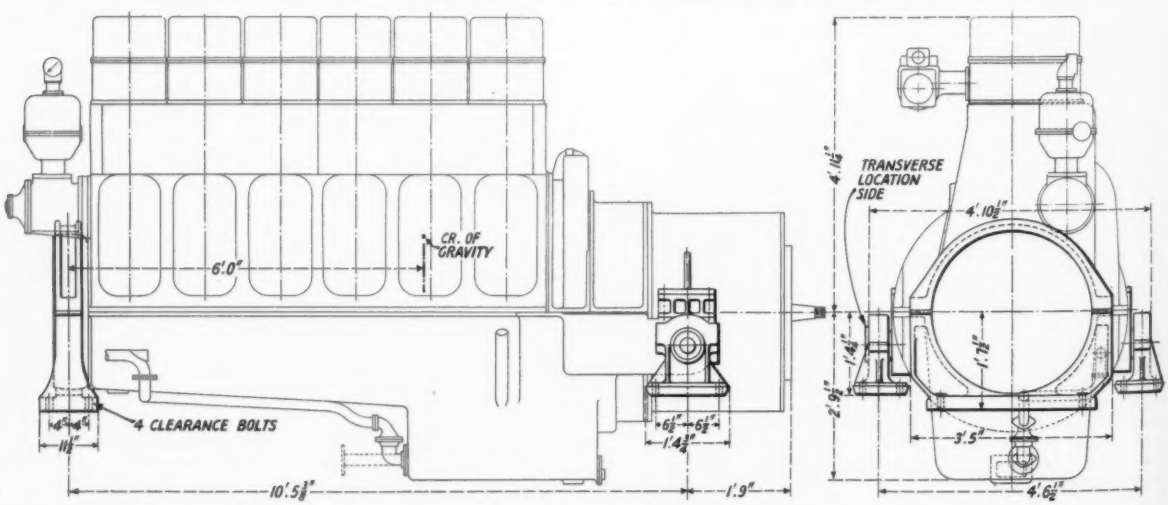
Single Mass-unit Supports

The double bell-housing type of support adopted for the bogie-mounted 130 b.h.p. Leyland engines in the latest New Zealand Government Railways railcars is an adaptation of road practice, and in some diesel-electric vehicles there is a further development in that, in order to locate the generator stator with respect to the engine so that the entire assembly could be supported as a single-mass unit,



Bell-housing rear engine support with rubber blocks, bogie-mounted Leyland engine

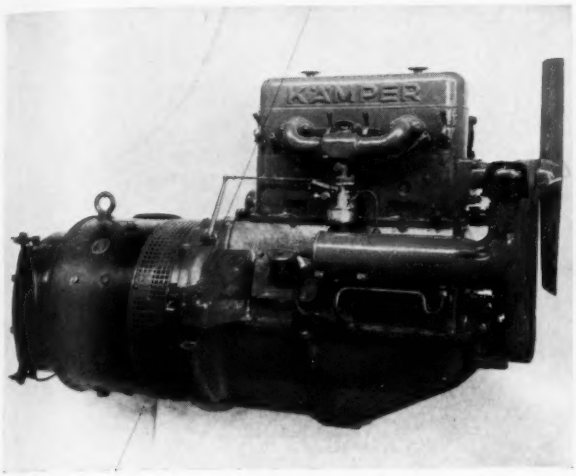
the rear bell housing has been made to serve the double purpose of a frame support and a generator fan outlet. The bolted connection of the bell housing to the engine frame is a limiting factor in the strength, and the rear supports of such a group must be located against it to eliminate any bending moment. The combination of engine and generator in a single stationary structure was a favourite practice of Armstrong-Whitworth when using the small high-speed Armstrong-Saurer engines, and this principle, requiring no power connections with the remainder of the vehicle other than cables, lends itself to ideal flexible mounting, and does not need the highest degree of accuracy in the location of the set on the bogie or underframe. Such layouts are designed so that only a limited amount of energy is transmitted to the vehicle frame, and as the greater part of the disturbance appears as crankshaft torque, the best condition is obtained where



English Electric oil engine with three-point suspension. Such sets may be easily installed and replaced. To lift the set out it is only necessary to remove the three pedestal caps and break pipe joints. As the pedestals remain in position, no difficulty is experienced with external connections on replacement

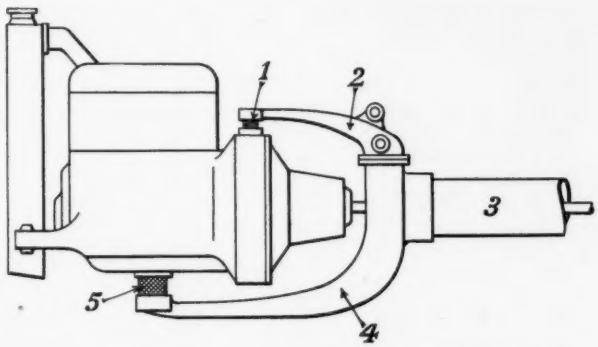
a high degree of freedom is permitted about the principal mass axis.

If the engine and generator frames are rigidly attached to one another the set is in static torsional equilibrium, and the supporting structure carries only the weight and the inertia torque, and the vertical impacts can be cushioned by using flexible supports for the carrying frame. For such mountings it is desirable that the engine-generator group should be carried in a manner such that the mounting plane contains the principal mass axis, which in the majority of applications makes a considerable angle in the vertical plane with the crankshaft centre line. With three-point suspension this entails one high support at the front end of the engine and two lower side supports at the forward end of the generator or gearbox. In practice such a layout is limited to the small high-speed type of engine.



Kamper engine and Siemens-Schückert generator arranged as a single-mass unit with one supporting foot in front and two at the sides near the generator

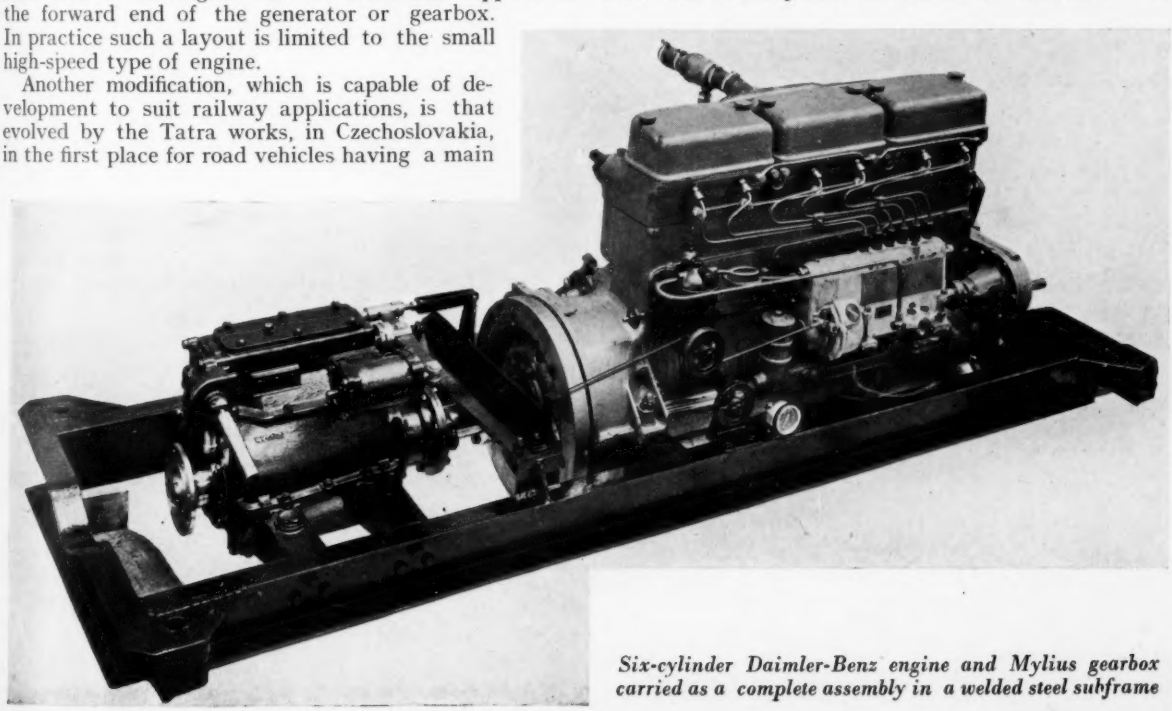
Another modification, which is capable of development to suit railway applications, is that evolved by the Tatra works, in Czechoslovakia, in the first place for road vehicles having a main chassis member of tubular shape. As shown in the accompanying illustration, taken from the patent specification, the engine, complete with radiator and gearbox, is mounted on the front of the chassis member *3* by means of the main arm *4*. A second arm *2*, usually detachable, is secured to the top of the flywheel or fluid coupling casing, the relative lengths and positions of the two arms being such that a line joining the two points of suspension would pass through the centre of gravity of the supported mass. Rubber blocks are inserted at *1* and *5* to form resilient mountings.



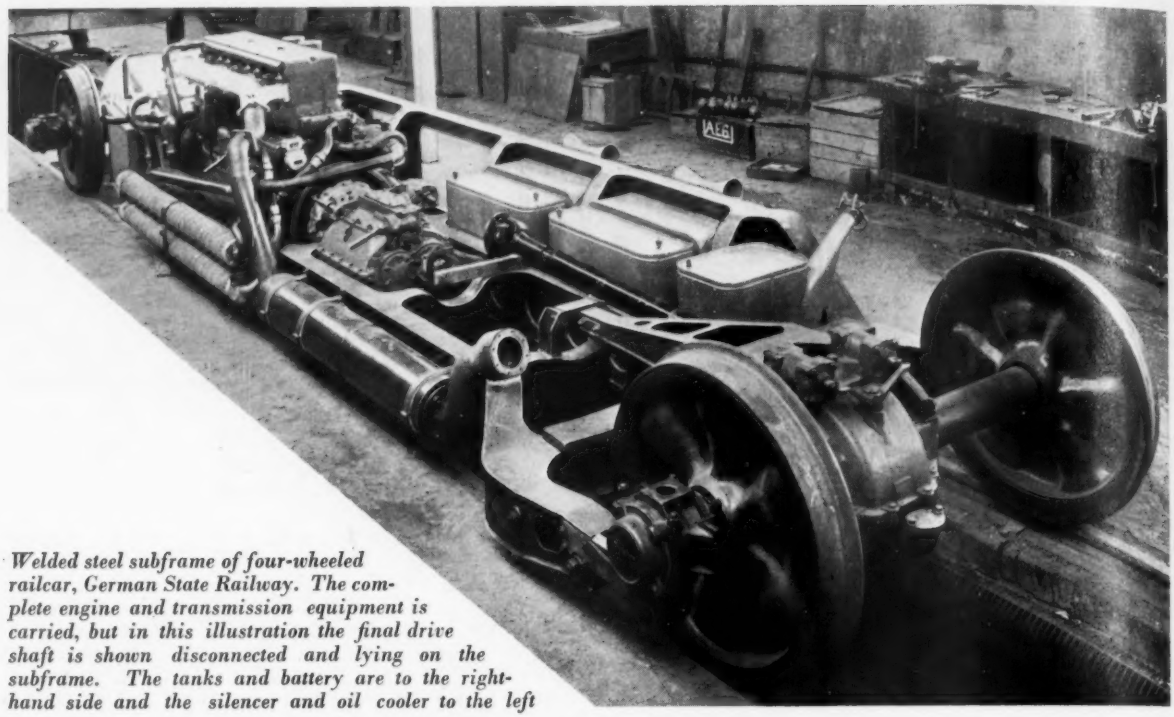
Tatra suspension for use with tubular chassis members

With larger engines direct-coupled to generators and located on the main underframe of the car, or on the frame structure of a locomotive, the three-point type of trunnion mounting as used by the English Electric Co. Ltd. has given very satisfactory results.

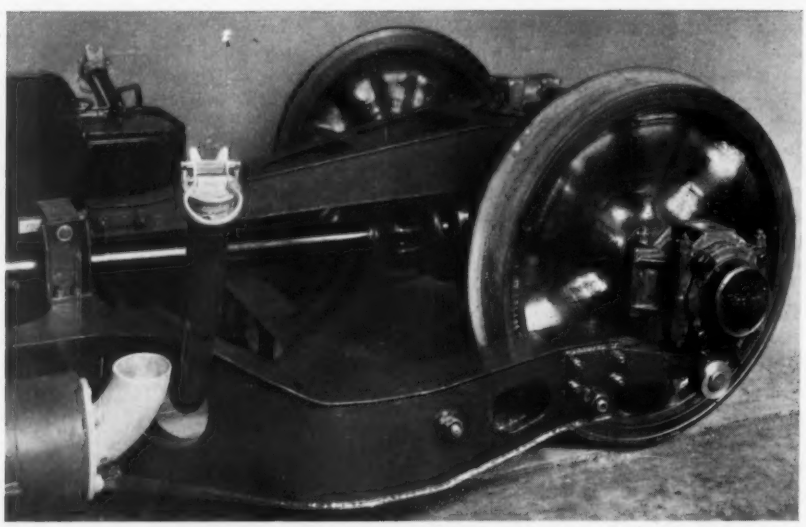
It almost eliminates the bending moment at the bolted attachment. Each suspension point is spherical. At the front a large-diameter cylindrical sleeve is free to slide in a spherical ring, and as the back end is anchored axially this provides the necessary means for expansion of the engine when warm. The lateral location is on one side, with free expansive movement on the other. The



Six-cylinder Daimler-Benz engine and Mylius gearbox carried as a complete assembly in a welded steel subframe

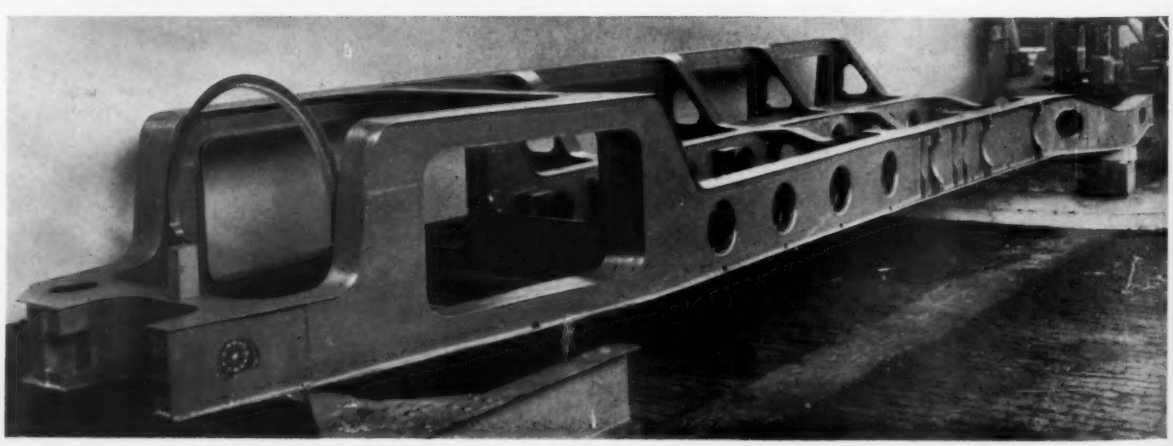


Welded steel subframe of four-wheeled railcar, German State Railway. The complete engine and transmission equipment is carried, but in this illustration the final drive shaft is shown disconnected and lying on the subframe. The tanks and battery are to the right-hand side and the silencer and oil cooler to the left

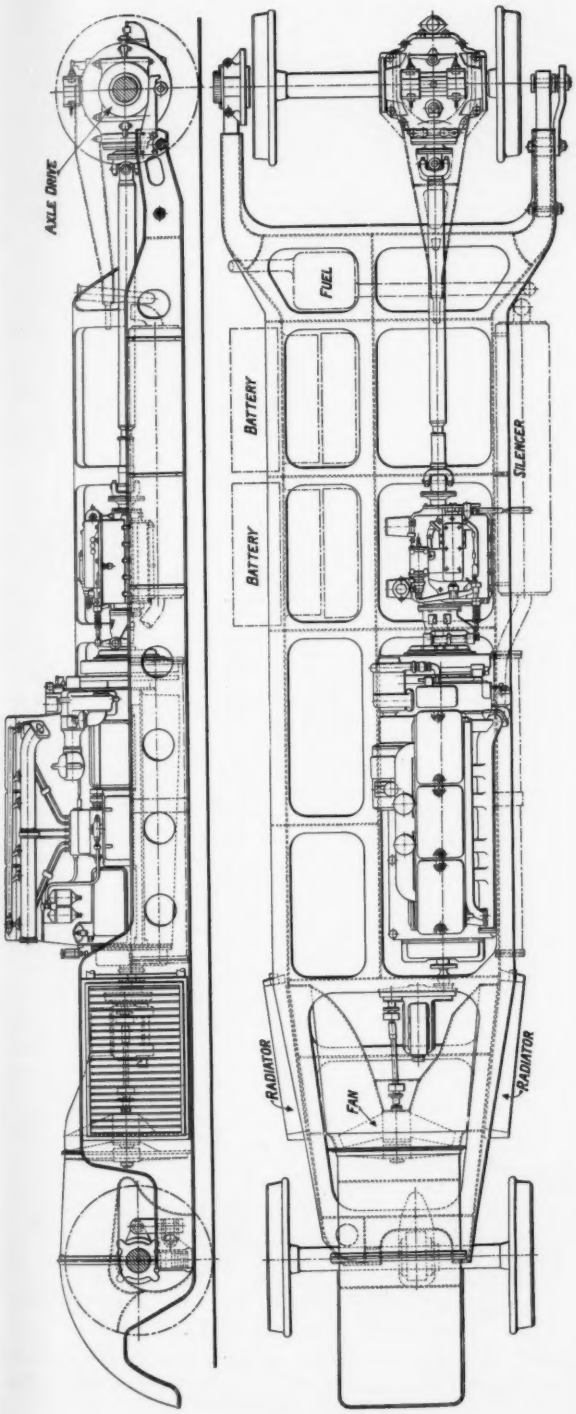


Left: One end of welded steel subframe spring-supported on outside of axles. The wheels and axles are of the Bochumer Verein light-weight pattern. The fuel tank is carried on one side, but has filling holes on both sides

Below: Welded steel subframe, arranged for mounting direct on the axles of a four-wheeled railcar. See top illustration for a similar subframe in position



Arrangement of welded steel subframe for Reichsbahn four-wheel 16-ton 150-b.h.p. M.A.N.-engined railcar with a wheelbase of 23 ft. 7 in. These cars have a Mylius four-speed gearbox and run up to about 45 m.p.h.



pedestals are always mounted on resilient insulation, and there is no need for elaborate alignment.

Another form of three-point suspension system suited to the needs of bogie mounting is the arrangement used by Drewry in the Argentine railcars for supporting mechanical transmission constituents. From the casing of the final and reverse drives on the axle a subframe of channel sections runs forward to the centre transom to which it is anchored through a bracket with rubber and steel springs, which take the torque reaction. On top of the channels is mounted the gearbox and its operating cylinders.

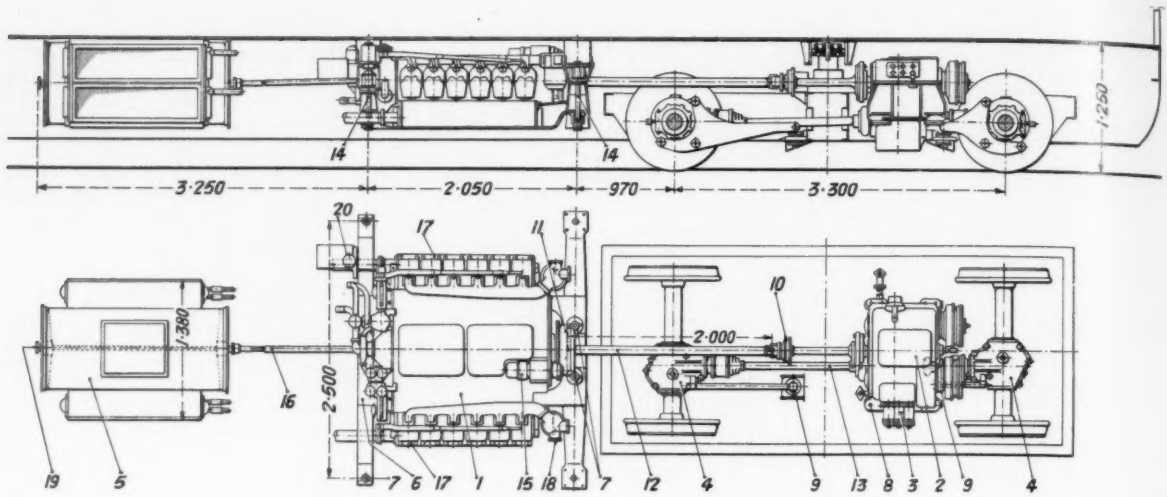
In four-wheeled railcars it is not uncommon practice to sling the engines—whether they be vertical or horizontal—below the car floor, and to carry them on a subframe secured to the underframe. This method has been adopted also for double-bogie railcars, and permits either single-end or double-end drive as required. Sometimes the engine is attached rigidly to the subframe, sometimes with the intermediary of a strip of balata packing, and sometimes with rubber supports. The same selection, plus the addition of helical springs, is also applicable to the points of attachment of the subframe to the car underframe.

Axle-Supported Subframes

The highest development of this form of mounting is that now embodied as a standard by the German State Railway for its light four-wheeled railcars. From four of the accompanying illustrations it will be seen that the complete engine-transmission equipment, including the auxiliaries but excepting the driver's controls, is located on the subframe; even the axle drive is connected to the subframe through its torque reaction arms. If the driving control connections are broken and the car body lifted or jacked, the complete power-transmission equipment, with wheels, can be run out and replaced by another set. The use of welding for the construction of the subframe has given exceptionally convenient mountings and housings for the various constituents.

The feature of the arrangement is the provision of a three-point suspension for the whole subframe ensemble, which connects it directly to the axles and not to the car underframe, whereby engine vibrations and engine noise are kept away from the car body. At one end the subframe load is taken at a central point through a transverse laminated spring located beneath the axle. At the other end the subframe has a spring connection to the undersides of the Fischer roller bearing axleboxes; a safety link rides on the end of the axlebox spring pin and at the other end is welded to the subframe just above the pin of the laminated spring buckle. The subframe is symmetrical about the longitudinal centre line of the car, but the engine, gearbox, and axle drive are slightly to one side, and well out on the other side are carried the light-alloy fuel and water tanks and the battery. On the engine side are located the silencer and the Sauerbier type of oil cooler. There are two vertical cooling water radiators, one on each side near the carrying axle, and the fan-produced draught is induced through a metal cowling supported from the underframe by a bell housing and carried over the adjacent axle. There are slight detail differences in the subframes of various cars, as may be seen from the accompanying illustrations.

A 150 b.h.p. six-cylinder M.A.N. oil engine with Bosch fuel injection equipment forms the power unit, and immediately behind it on the subframe is a four-speed Mylius presynchronising gearbox. Thence a hollow cardan shaft with two universal joints and a flexible coupling takes the torque to the reversing and final drive wheels on the



1—Engine
2—Gearbox and reversing gear
3—Three-cylinder air compressor
4—Axle drive and torque arm
5—Water and oil cooler assembly
6—Engine subframe
7—Flexible mountings for subframe
8—Flexible mountings for gearbox
9—Torque arm cushioned pivot
10—Cardan shaft intermediate bearing
11—Flexible coupling in flywheel
12—Primary cardan shaft
13—Axle-drive cardan shaft
14—Lowering and rolling frame
15—Engine starting motor
16—Fan driving shaft
17—Exhaust manifold
18—Intake filter and manifold
19—Connection for further auxiliary drives
20—Electric control box

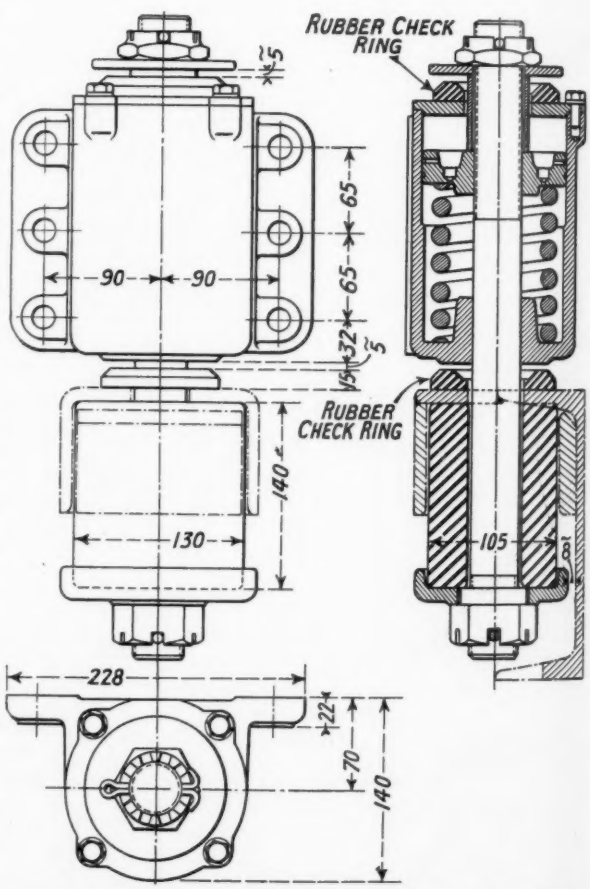
Location and mounting of 12-cylinder 275-b.h.p. D.W.K. horizontal engine in a bogie railcar

axle. The track wheels, 900 mm. (35½ in.) in diameter, are of the Uerdingen light-weight type mounted on hollow axles.

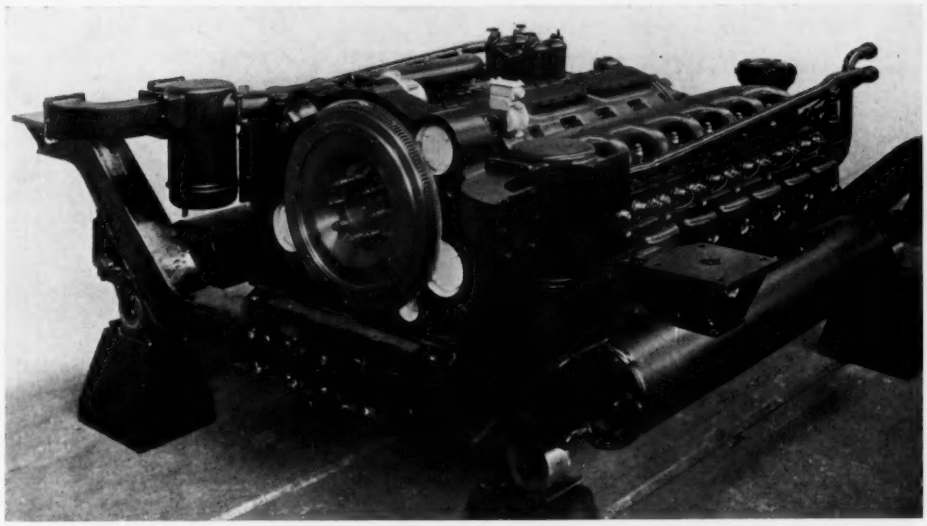
With subframes supported directly on the axles it is essential to use welded construction in order to keep down the weight, for the span between the supporting points is very long. Subframes slung from the car underframe can be made shorter and lighter, but in practice they do not house the complete auxiliary and ancillary equipment, so that the weight saved by the shorter length is largely counterbalanced by extra brackets and connections. However, with modern quick-running railcar engines weighing 14-16 lb. per b.h.p. the static bending stress imposed on the car frame by the engine and transmission weight is rarely of prime importance, although from a power-weight point of view everything should be as light as is practicable. But if weight is to be saved the subframe cannot be very much below the underframe, and a vertical engine would then project through the car floor; consequently it must be placed to one side so that it is underneath the seats instead of interfering with the central gangway, the extreme application of this system being found in the side-mounted engines of the A.E.C. railcars on the Great Western Railway. The shorter subframes invariably have four-point suspension from the underframe, and to prevent noise and vibration reaching the passenger saloons. the use of rubber or other elastic means is essential.

Horizontal Engines

Horizontal engines not only assist the traffic department to gain the maximum amount of revenue-earning space from a given car floor area, but they also considerably ease the problems of under-floor mounting and axle drives. One of the accompanying drawings shows the location of one of the German standard 275 b.h.p. 12-cylinder engines made by D.W.K., carried neatly below the car floor and driving a gearbox mounted on the bogie. In other arrangements the gearbox is located on the subframe along with the engine. The subframe itself is of welded steel construction with the cross members of box form, and it is short, shallow, and light. It is fitted with four rollers on



Detail of rubber and helical spring supports for subframe carrying a 150-b.h.p. engine and gearbox, and slung from railcar underframe



275-b.h.p. Deutz horizontal engine carried on welded steel subframe attached to the railcar underframe through a combination of rubber and steel springs. Note the rollers for rolling out the whole assembly after the spring supports have been loosened

the bottoms of the cross members, so that the ensemble can be dropped and then rolled out sideways on runner bars after disconnecting the main and auxiliary drives and the fuel lines, and replaced in a similar manner by a spare unit. A combination of rubber and helical steel springs is used to take up the noise and vibrations passing from the subframe to the car frame.

Elimination of the vibrations transmitted to the car body can be effected by allowing the engine subframe to swing in a direction opposite to the engine when suspending it on helical springs beneath the car. Although arrangements of this kind are efficient they sometimes necessitate considerable movement of the subframe in order to meet the movements of the engine centre of gravity, and another disadvantage is that they are subject to oscillations which under certain circumstances may come within the range of the subframe resonant frequency.

Rubber and Spring Pads

The application of rubber blocks is advantageous, as, besides being highly elastic, such pads also give improved dampening features, and dangerous subframe oscillation can be almost eliminated. With rubber pads it is not always possible to meet the movements of the engine centre of gravity, as the displacement of the subframe results in a change in the shape of the pads. The softer the pads the smaller will be the forces transmitted to the suspension, but the smaller will also be the forces returning the subframe to the original position. These considerations refer not so much to the dampening of vibrations but to the prevention of their extension, by meeting the movements of the engine mass with an opposite mass movement of the subframe, thus utilising the greater elasticity of the pads rather than their dampening features.

A subframe suspended on elastic pads usually has a frequency considerably lower than the frequency of engine vibration, and even if the engine should pass through this particular range there may not be sufficient time to produce undesirably great vibration. But the possibility of resonant vibrations must be checked when using rubber of poor dampening quality. Assuming the weight of rubber to be 0·073 lb. per cu. in. and its modulus of elasticity 290 lb. per sq. in., the speed of an oscillation wave in a rubber block will be about 98 ft. per sec. With an engine running at 1,500 r.p.m. and giving a wave 4 ft. long, a 6-in. rubber pad between subframe and car frame will contain only 12½ per cent. of the wave length at any given instant. With a dampening coefficient of 0·3, only 4 per cent. of the energy transmitted due to vibrations will be absorbed by the pad.

Care should be taken to eliminate any metal-to-metal contact between the subframe and underframe or bogie. So far as the life of rubber is concerned, best results can usually be obtained by stressing it in shear through the use of pads vulcanised directly to steel, but it is doubtful whether the extra expense involved will always be justified by the results. When using rubber pads all edges and corners should be removed, as they lead to a considerable reduction in the resistance to dynamic stresses. The useful life of rubber is reduced by exposure to the sun and by excessive temperature. The pads should be arranged to get efficient cooling, and a rubber composition showing good heat dissipation should be used. Oil is one of the things most deleterious to the life of rubber, and it is in just this direction that a real solution is hard to find in railcar work, for there are few spots about a chassis where oil is not. As rubber loses its elasticity when not under fairly constant work, the pads should be designed to make use of every portion, and idle sections should be eliminated by hollowing. If a large amount of rubber is necessary it may be advisable to use a number of small units to simplify production, ensure better vulcanisation, and more efficient operation.

FILTER PATENT EXTENSION.—In the High Court of Justice, Mr. Justice Simonds, recently delivered judgment in regard to the petition presented jointly by Stream-Line Filters Limited and Dr. H. S. Hele-Shaw, for the extension of the term of the basic patent for Stream-Line filters. Mr Trevor Watson, K.C., said that the lubricating oil consumed in this country, amounting to a yearly total of 150,000,000 gal., had to be imported from abroad, and the filter enabled the impurities to be efficiently separated from the 95 to 97 per cent. of good oil still remaining. Mr. Justice Simonds, in the course of his judgment, said that the patent showed great utility to the public. It was of real importance that, by the use of the invention. lubricating oil could be used over and over again at a trivial cost, having regard to the saving effected. There had been no undue delay in exploiting the patent, and a sum of £70,000 had been expended for that purpose. Streamline Filters Limited now appeared to be in a strong position to market the invention. He was justified in making a re-grant for a term of five years from date of the expiration of the second patent.

DINING CAR DIESEL TRAINS FOR SOUTH AMERICA

Design embodying horizontal engines and gear drive

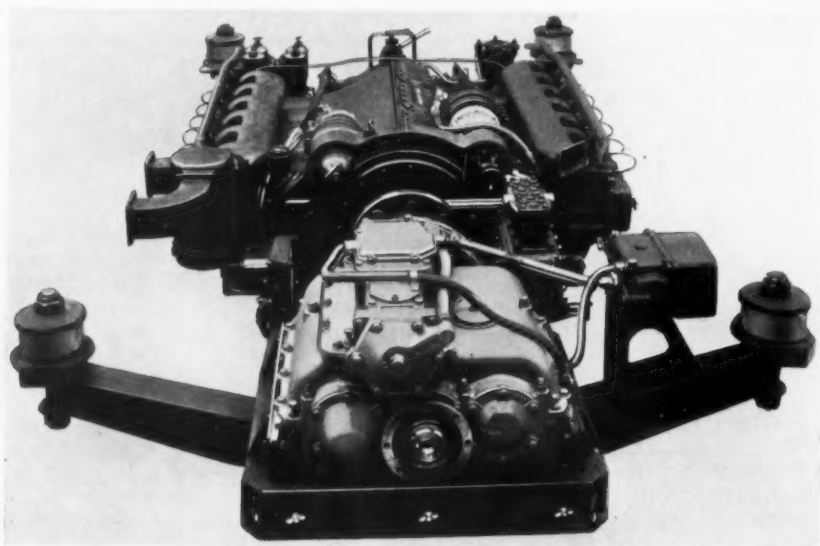
Above : Three-car train for the Sorocobana Railway on test

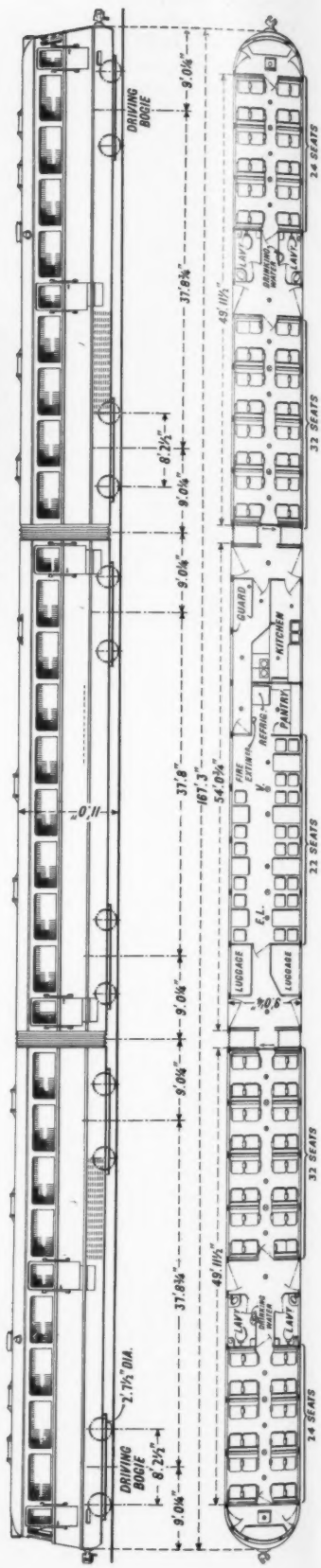
FOR operation over the metre-gauge main line from São Paulo to Botucatu, which is 220 miles long and includes gradients as steep as 1 in 40 together with numerous curves, and rises to a height of 3,200 ft. above sea level, the Sorocobana Railway, in Brazil, is putting into passenger service two triple-car non-articulated diesel-mechanical trains, which have just been shipped from Germany. Powered by Deutz engines and fitted with Mylius mechanical transmission, these trains were built by the Gebrüder Credé A.G., and are suited to a top service speed of 110 km.p.h. (68 m.p.h.); they are required to maintain a speed of 80 km.p.h. (37 m.p.h.) up grades of 1 in 50.

The requirements for fairly long distance travel have been met by using a restricted number of seats of comfortable shape and with ample room between, and by the inclusion of a full restaurant car service. The mechanical

Right : Diagram of double-engined 550-b.h.p. train

Below : Deutz 275-b.h.p. horizontal engine and Mylius five-speed gearbox on common subframe





design of the trains is such that if required for shorter distance work, the centre dining car can easily be taken out of the formation. There is a total of 112 first class seats plus 22 seats in the diner on a tare weight of 70 tons and within a length of just over 167 ft. The aggregate output of the two engines is 550 b.h.p. as a normal maximum, giving power-weight ratios of 7·9 b.h.p. per ton of tare and about 6·75 b.h.p. per ton of gross weight. The tare weight per seat is 1,162 lb., by no means a bad figure considering the dining car accommodation. The luggage compartments are located on the centre vehicle, so that if the formation is made up only of the two end cars, the accommodation is suited solely to suburban or excursion types of traffic.

By the use of welded construction, with high-tensile steel, for the body frames, underframes, and the bogie, and by the use of light alloy doors and interior fittings, it has been found possible to keep down the weight. The body and underframe of each car are constructed as quite separate units, and the body rests on the underframe through the intermediary of about a score of rubber blocks, and in this way the noise and vibrations arising from the track and from the underfloor-mounted engines is kept away from the passenger saloons. The floor frame consists of U and Z girders, and angles and T sections are used for the side pillars and roof frame members; practically all of these details are welded, and the principle of construction has been that each member should take an almost equal share in the load. The main side members of the underframe are of I section supported by a welded steel truss framing. Extremely rigid cross members are provided and are welded to the side members through large gussets, some of which are of box form. At the ends, the main side members are curved round to form the buffer and drag box structure housing the Henricot automatic couplers, and the buffing load is transmitted to the cross transom above the bogie pivots through two tubular struts.

The interiors of the saloons are finished in a light blue shade, with a cream ceiling; the floor carpet and the leather coverings of the seats are in a darker shade of blue. The seats are carried on chromium-plated steel tubular frames. All the side windows of the saloons are of the drop type, fitted with Securit glass, but Plexi glass is used for the curved end windows in the driver's compartments. The side entrance and exit doors are connected through a system of levers to the steps, which let down when the doors are opened, and fold up flush with the side panels when the doors are closed. There is a double bellows connection between the cars, the outer sheathing simply preserving unbroken the outline of the train. As further protection against the transmission of noise and heat the interiors of the side panels were given a light asbestos spray. The floor sheets are covered with a double layer of cork and one of linoleum beneath the carpets.

Particular attention was given to the torsional strength of the welded steel bogie frame structure, so that it might easily take up the stresses resulting from running at comparatively high speeds through small-radius curves, a practice which is safe from the vehicular point of view because of the low centre of gravity and the care which has been taken to check oscillations. A combination of laminated and volute springs has been used for the swing bolsters, and the swing links, bolster stops, and pivots are provided with rubber cushioning blocks. The 800-mm. (31½-in.) wheels are forced on axles supported on S.K.F. roller bearings. A centralised grease pressure system of lubrication has been adopted for all of the frictional surfaces on the bogies. Compressed-air brakes are incorporated, and by means of a 10-in. cylinder on each end-car bogie and an 8-in. cylinder on the dining-car bogies, apply clasp brakes with two blocks to each wheel of the train. A handbrake in each driving compartment operates on the wheels of the adjacent bogie only.

On a subframe below the floor of each of the end cars is a 12-cylinder Deutz horizontal engine with a nominal output of 275 b.h.p. at 1,500 r.p.m. This engine is of the so-called German standard type, developed originally by four German builders in collaboration with the Reichsbahn. The cylinders, fitted with pre-combustion chambers, are 130 mm. by 190 mm., and the dry weight of the engine is 4,850 lb., equivalent to 17½ lb. per b.h.p.; this weight does not include the silencer or starting motor, and with these auxiliaries and the contained 130 litres of water and 90 litres of lubricating oil the weight is about 5,800 lb. Fan-ventilated radiators for the cooling water and lubricating oil are located beneath the car floors, and the fan is driven through a cardan shaft from the inner end of the engine, that is, at the end remote from the transmission drive.

Mylius Transmission

On a common subframe with the engine is carried a Mylius five-speed type E gearbox of the pre-selective pattern, with an air-operated multi-plate dry main clutch. The gearbox ratios are 3·68, 2·15, 1·42, 1·0, and 0·738 to 1. A short cardan shaft takes the drive to the inner axle of the end bogie, where the reversing gear is incorporated with the axle drive, and thence another cardan shaft leads to a simple bevel drive on the outer axle. The torque arms of both axle drives are connected, so as to reduce the loading imposed upon the bogie springs when starting or during a gear change.

The new form of Mylius semi-automatic control has been embodied, and the gear pre-selection and engagement and the corresponding engine control are performed merely by pressing a button, of which there are five on the driving control panel, one for each gear step. By pressing down the correct button there is energised a relay which admits air into the pre-selecting cylinder, shown on the right hand of the gearbox in one of the accompanying illustrations. At the same time the solenoid-operated ratchet of that gear step is pulled down, and limits the movement of the cylinder rod up to the position corresponding with that of the gear to be engaged. Upon this pre-selection being performed, a further relay is energised by means of a switch attached to the pre-selector mechanism, which mechanism then returns to its original position. The second relay connects the main clutch and the gear operating cylinder with the main air supply, thus disengaging the main clutch and the gear then in operation, and synchronising the gear to be engaged; compressed air is also admitted into the engine throttle control cylinder, to reduce the speed of the engine during the gear change. When the necessary pressure has been built up in both cylinders, the current is automatically cut off from the second relay, thus disconnecting the gear and clutch operating cylinders from the air supply, and coupling them with an expansion chamber into which the air slowly escapes; this operation engages the gear which was pre-selected and synchronised, and also the main clutch, and in addition the engine throttle is gradually opened to its original position. One of the two holes connecting the expansion chamber with the atmosphere is closed when the first gear is being engaged, so as to ensure a slower engagement of the main clutch when the engine is being started. Within the range of the individual gears, the car speed is controlled by the engine throttle handle, in which is incorporated a dead-man device.

DIESEL LOCOMOTIVES IN HIGH-SPEED SERVICE

A review of the diesel locomotive operation on the Chicago-Los Angles Super-Chief train, in comparison with the steam locomotives used on other express services

*E. E. CHAPMAN, A.T.S.F. Railroad**

ON September 19, 1934, the Santa Fe placed an order with the Electro-Motive Corporation for a 3,600 b.h.p. diesel-electric locomotive having a top speed of 98 m.p.h. This locomotive was received in the fall of 1935 and test runs were made between Chicago and Los Angeles. It was immediately apparent that there was a considerable amount of track work to be done in order to maintain this schedule, such as increasing the length of the transition on curves, increasing the super-elevation and, in cases where reverse curves would not allow the extension of the transitions, a single curve with less degree of curvature was developed.

All of this was not done before the start of the 39¾-hr. schedule, but as fast as plans could be developed the road was adapted to this increased speed. It was necessary to locate fuel and water stations for this type of power so that the least possible time would be lost *en route* in taking these supplies. During the preliminary runs it was found necessary to make some additions in radiation facilities for proper cooling of the diesel engines, as well as to filter the air to be used in the diesels in order to reduce the wear of pistons and liners.

This first diesel-electric locomotive had axleboxes equipped with the conventional waste-type lubrication with a constant supply of lubrication by means of a force-feed lubricator. This was not considered satisfactory, so the bearings were changed to the roller type. A type of wheel had to be developed to withstand the heavy braking which was necessary at high speeds on steep descending grades, and heavy service applications made from high speeds to stop. Indications were that the four-wheel truck, which was originally applied to the first diesel-electric locomotive, was carrying considerably more wheel load at rail than was advisable, both from wear standpoint and from that of the development of thermal cracks from heavy braking. As a result, the second 3,600 b.h.p. diesel-electric locomotive, which was ordered and built to attain a top speed of 118 m.p.h., was equipped with six-wheel trucks. This change produced a radical increase in mileage between wheel turnings and practically eliminated thermal cracks, and the cracks were still further reduced by certain changes in the chemical content of the steel.

With the change to the six-wheel truck, the driving wheels were first located at the front and back of the front and back trucks. It was desired to develop a still more favourable safety factor in the diesel-electric locomotives and the power wheels were therefore applied to the middle and back wheels on the front truck, leaving the front or guiding wheels without motor drive. Brake shoes were eliminated from those wheels for further safety.

At the present time the diesel-electric locomotives are making the run of 2,227 miles from Chicago to Los Angeles in 39¾ hr. with the same diesel-electric locomotive handling the train throughout. These trains could be handled with one change of steam locomotive for this distance. Comparison of the weights of the later type diesels with the two new types of steam locomotives in working order is as follows:—

3,600 b.h.p. diesel-electric locomotive ..	583,400 lb.
4-6-4 type steam locomotive and tender ..	808,700 lb.
4-8-4 type steam locomotive and tender ..	895,900 lb.

* In a paper presented before the Society of Automotive Engineers.

The cost per nominal horsepower runs approximately as follows:—

3,600 b.h.p. diesel-electric locomotive ..	$100 to $110 per nominal b.h.p.
4-6-4 type steam locomotive .. / 4-8-4 type steam locomotive ..	$33·50 to $35·40 per i.h.p.

Another thing of note is the weight per horsepower of the power unit which the two types of locomotives can develop:—

3,600 b.h.p. diesel-electric locomotive ..	Wt. per rated b.h.p. 162 lb.
4-6-4 type steam locomotive .. / 4-8-4 type steam locomotive ..	188 to 156 lb.

The operation of the diesel-electric locomotive requires a crew of two, consisting of the engineman and helper. The availability of the diesel-electric locomotive has been good, the fleet on the Santa Fe making an average of 18,500 miles a month and individual locomotives making as high as 27,000 miles a month compared with the two latest classes of steam passenger locomotives making an average of 12,400 miles a month with a maximum figure of 18,600. Neither the diesel-electric locomotives nor the new steam passenger locomotives have gone through a general shopping, but the indications are that the diesels can be kept in service and various repairs made with a very small amount of delay by having extra spare assemblies for quick exchange. The ability to make repairs on one of the four diesel-electric half-units and to keep running with the rest of the units or when power demand is low is of particular advantage. Diesel-electric locomotives handle trains easily from a state of rest, and, with heavy trains, give a minimum of disturbance; due to the high tractive force, trains can be quickly brought to running speed so as to be able to reduce maximum speeds.

The first 3,600 b.h.p. diesel-electric locomotive handled seven conventional standard heavy passenger cars in the Super-Chief train, the total weight being 820 Engl. tons, including the weight of the diesel-electric locomotive, or 510 lb. per b.h.p. At the time the second diesel-electric locomotive was received the Budd lightweight cars were ready for this service and nine of these lightweight cars were used in the Super-Chief train, the total weight being 708 Engl. tons, including the weight of the diesel-electric locomotive, or 438 lb. per b.h.p.

Service Advantages

The particular advantage of the diesels is the distance they can go between refuellings. Between Chicago and Los Angeles on the present schedule it is necessary to refuel the diesel-electric locomotive at two points on the road in each direction, and it is necessary to take water each way at three different points. With a steam locomotive on such a run it would be necessary to refuel the 4-6-4 class twice between Chicago and La Junta, Colo., this type being changed off at the latter point after running 992 miles. The 4-8-4 type would then be used over heavy mountain grades from La Junta to Los Angeles, Calif., a distance of 1,236 miles, and it is necessary to refuel these locomotives twice between these points. These steam locomotives must have the water replenished in their tenders about every 200 miles, or at division points where engine crews are changed with such tonnage as is handled on the 39¾-hr. schedule using 3,600 b.h.p. diesel loco-

motives. Diesel-electric locomotives also require less time for service and fewer stops for service requirements. This is particularly true in regard to lubrication of running gear.

The kind of fuel oil required on the Santa Fe diesel locomotives is a 28-gravity oil, from 26 to 38 sec. viscosity, Saybolt Universal, and this oil must have certain characteristics in order to secure best results when used in diesel locomotives, whereas the steam locomotives use a refinery residium, or a cracked residium, the characteristics of which are equivalent to United States specification for bunker C oil. As a result the cost is 1·8 times as much per gallon for diesel fuel oil as for the steam locomotive fuel oil. Due to the high thermal efficiency, the diesel locomotive uses about 30 per cent. of the amount of fuel which an oil-burning steam locomotive uses, and this more than offsets the difference in price per gallon now in favour of the steam locomotive. This includes the use of diesel oil in the steam-heating boiler of the diesels. The lubrication of the diesel-electric locomotives is an appreciable cost in their operation, inasmuch as the oil is high priced as compared with the valve oil used for steam locomotives, and it needs constant replenishing. It is felt that there is considerable work to be done on the improvement of diesel lubricating oil in order to get away from its susceptibility to lacquering with consequent sticking of rings and other troubles.

Where it is possible to have a road operated exclusively with diesel locomotives a considerable saving can be made on cost of investment, maintenance and operation of water and water-treating plant facilities. However, where diesel and steam locomotives are operated over the same territory it is necessary to supply special piping and hose for furnishing diesels with water at their regular watering stations and also for protection of emergency stations. The cost of repairs of the diesel-electric locomotives handling streamlined trains is being constantly reduced so that the cost per locomotive-mile basis compares very favourably with the average for steam passenger locomotives which handle various other main-line trains on this same route at considerably lower speeds. The riding characteristics of the Santa Fe diesel-electric locomotives are equivalent to that of passenger cars which they handle and are distinctly superior to the steam locomotives.

Express Railcar Services in France—(*continued from page* 1115.)

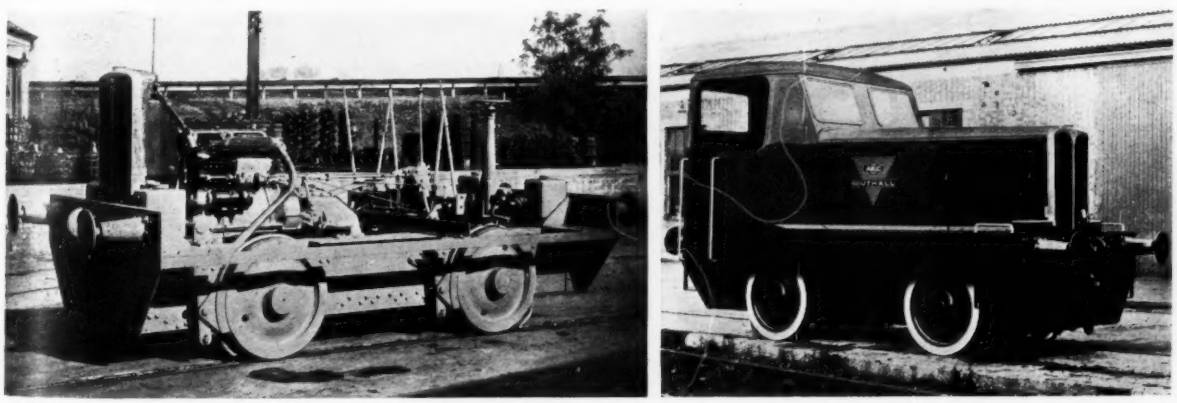
On the Renault ABJ railcars, with one 300 b.h.p. 12-cylinder vee Renault engine, running from Nancy on express, semi-direct and local services, it was found necessary to arrange an intermediate partial inspection of the bogies, and especially of the engine, after 75,000 km. (46,500 miles). The railcar ensemble—including body, engine and bogies—goes through the shops for normal overhaul after 150,000 km. (93,000 miles). This intermediate inspection comprises complete dismantling, examination of the constituents for fatigue cracks, replacement of suspected parts (*e.g.*, scaled connecting rod bearings), and finally, the systematic renewal of various small parts such as cylinder head gaskets and the piston rings. Naturally, all the work done in the 25,000-km. (15,500-mile) periodical inspection such as testing the cylinder heads, valve grinding where necessary, and the replacement of injectors, is also carried out.

English Industrial Shunter

HITHERTO the A.E.C. engine in rail traction has been associated entirely with railcars, principally in the 130 b.h.p. model, but the Associated Equipment Co. Ltd. has just built for shunting service at its Southall works a four-wheeled shunting locomotive powered by one of the four-cylinder engines developing 78 b.h.p.

The locomotive frame structure is built up of $\frac{3}{4}$-in. plates reinforced by channels and angles, and is surmounted by a steel plate bonnet and cab. The 37-in. wheels are of the disc type and are forced on axles of the cannon pattern, which are carried on large-diameter taper roller bearings. The bearing springs are set inside the wheels and are arranged to take up the torque reaction. A hand screw brake is fitted and operates one block per wheel; the mechanism has link adjustment between the column and the cross shaft. The locomotive has a wheelbase of 7 ft. 6 in., an overall length of 18 ft. $1\frac{1}{2}$ in., a width of 8 ft. 1 in., and a maximum height of 11 ft. 4 in. The weight is 13·3 tons and the maximum axle load 6·85 tons.

The engine and four-speed gearbox are arranged as one unit and supported on a three-point trunnion system, the trunnion brackets being bolted directly to the locomotive frame structure. The four 120 mm. by 146 mm. cylinders of the engine are supplied with fuel by C.A.V.-Bosch injection equipment. A standard A.E.C. plate type clutch is embodied, and the four-speed gearbox incorporates a countershaft drive to both axles and includes the reverse gear. The speeds with normal top engine revs. are 2·7, 4·4, 7·5, and 11·9 m.p.h., and the corresponding tractive efforts 8,850, 5,440, 3,220, and 2,125 lb.



The 13-ton diesel-mechanical shunter built by the A.E.C.

LIGHT-WEIGHT RAILCARS

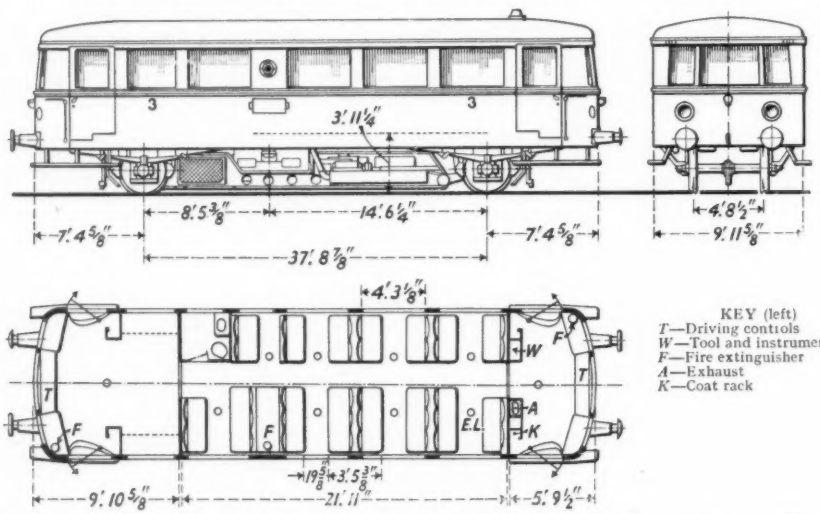
Important savings of weight and other advantages are claimed for aluminium-magnesium alloys in the construction of railcars for the German State Railway

APART from the general desirability of economy in materials, reduction of tare weight is specially attractive in railcars, owing to the frequency of starting and the economic advantage of reducing energy consumption and power demand during acceleration and on gradients. There seems to be a fairly general agreement that it is inadvisable to increase the permissible stresses in the materials hitherto generally employed. So far as German practice is concerned it has been felt undesirable under present conditions to use high-tensile steels with high percentages of imported metals. Actually, neither of these courses is necessary, as suitable reductions in weight can be effected by the use of light-metal alloys and by arranging, so far as possible, that all components contribute to the strength of the vehicle. Beginning in the year 1926, the German State Railway and the Halberstadt-Blankenburg Railway made various trials with coaches embodying components made of light-metal alloys. The results obtained were progressively more encouraging as designs were developed taking greater advantage of the capabilities of these materials, including the possibility of making complicated sections by extrusion.

In order to obtain conclusive information as to the capabilities of light-metal alloys, the Reichsbahn in 1934 placed orders with the Maschinenfabrik Augsburg-Nürnberg (M.A.N.) for the construction of two four-wheeled diesel railcars of 150 b.h.p., each to accommodate 50 passengers and capable of a maximum speed of 75 km.p.h. (46½ m.p.h.). Orders were also placed for light steel railcars of the same floor area and power output, which are, indeed, the standard four-wheeled cars of the Reichsbahn, but it was specified that the design of the light-metal cars should be independent of that of the steel cars and such as to take maximum advantage of the light alloys.

With minor exceptions the coach bodies were built wholly of the light metal Hydronalium, developed by the I.G. Farbenindustrie, Bitterfeld. This is an aluminium-magnesium alloy containing up to 12 per cent. of magnesium. For underframes and other highly stressed parts a composition was used which gave a tensile strength of 35 to 38 kg. per sq. mm. (22¼ to 24 tons per sq. in.), but other components were made of cheaper alloys, that for sheet panels having a tensile strength of 22 to 25 kg. per sq. mm. (14 to 16 tons per sq. in.). The modulus of elasticity of all aluminium alloys is about 700,000 kg. per sq. cm. (9,954,000 lb. per sq. in.), but owing to the low specific gravity of the materials there is still a substantial saving in weight compared with steel, notwithstanding the increased dimensions needed in certain components to maintain sufficient stiffness. Load tests on the completed coaches of light alloy construction showed smaller deflections than in comparable steel coaches, owing to the whole structure sharing the load and contributing to the stiffness.

No plate thicker than 4 mm. (5/32 in.) is used in the underframes and the working stress is normally as low as 3 kg. per sq. mm. (1·9 tons per sq. in.), with a maximum of 5 kg. per sq. mm. (3·2 tons per sq. in.) under quite exceptional conditions. The weight of the Hydronalium cars in running order is 12·1 tons each, compared with 16 tons for the standard light steel cars, giving a saving of 3·9 tons, or about 24·5 per cent. The saving on the coach body alone is 2·65 tons, or about 26·2 per cent. The greater part of the saving is due to the use of Hydronalium (and Elektron for castings), but advantage was taken of the opportunity to embody in these experimental cars many innovations effecting further savings. The engine in these railcars is of the M.A.N., six-cylinder 150 b.h.p. type and it is used in conjunction with a Mylius four-speed gearbox. Other details such as the Bochumer Verein light-weight wheels and axles and the Fischer roller bearings are standard with those of the steel cars, and are illustrated in the article on engine mounting elsewhere in this issue.



Left : Diagram of 150-b.h.p. light-weight railcar, German State Railway

KEY (left)
T—Driving controls
W—Tool and instrument board
F—Fire extinguisher
A—Exhaust
K—Coat rack

Below : Hydronalium sections used in the construction of the mechanical portion

A—Top flange
B—Cantrail
C—Door pillars
D—Window frame
E—Body pillar
F—Underframe main member